Organizing & Displaying Data

TEKS and S.E.s

- B.2E Analyze data to formulate reasonable explanations, communicate valid conclusions supported by the data, and predict trends.

- B.2G analyze, evaluate, make inferences, and predict trends from data

- 8.2D Construct tables, using repeated trials and means to organize data and identify patterns.

Vocabulary

- Independent variable
- Dependent variable
- Control variable
- Qualitative
- Quantitative

Prerequisite Questions

- What is a variable?
- What is data?

- Our investigations provide us with data

- We try to organize that data in a way that will highlight relationships among our investigation's variables

- Variables can be: independent, dependent or controlled

Essential Question#1:

- What is the difference between the independent and dependent variables?

Independent Variables

- If you ask "What is **changing/being compared** in this experiment?", then you are looking at the independent variables.

- An independent variable is something that is manipulated during the experiment.

- Examples:
    1. Baking the same cupcake batter at different temperatures to determine which causes the best cake texture.
    2. Comparing the insulation material of coffee cups to see which one is better at keeping coffee warm.

Dependent Variables

- If you ask "What is **being observed/measured** in this experiment?", then you are looking at the dependent variables.

- A dependent variable is something that is responding or changing because of the independent variables during the experiment.

- Examples:
    1. Cupcake texture at a low temperature is too runny, while the texture at a very high temperature can be hard and dry.
    2. Coffee temperature cools very quickly when put in a thin glass mug but stays hot longer if you use a thick ceramic mug.

Control Variables

- If you ask "What is **being kept the same** in this experiment?", then you are looking at the control variables.

- A good experiment will only test ONE independent variable at a time.
- That means every other variable in the experiment must be the same for each trial.

- Examples:
  1. The same cupcake batter, oven, pan, etc. was used each time. The only difference in variables was the temperatures.
  2. The same coffee at the same starting temperature for the same amount of time were used in different cups. This means only the change is temperature was being tested.

Types of Data

- There are two (2) types of data that will be collected in labs
  1. Qualitative Data
  2. Quantitative Data

- Qualitative data is based on the quality of the material.
  - These will be measured with the 5 senses

- Quantitative data is based on the quantity of the material
  - These will be represented by numbers from measuring, massing or counting

Organizing Data

Month of the Year	Average Temperature
January	50° F
February	54° F
March	61° F
April	68° F
May	75° F
June	82° F
July	84° F
August	84° F
September	79° F
October	70° F
November	59° F
December	52° F

- Data should always be organized to see patterns. (Tables, groups, lists, etc.)

- The table to the left shows the average temperatures for the months of the year.

- It is made up of hundreds temperatures for all of the individual days.

- By organizing it by monthly averages, scietists can see the trends much easier.

Essential Question#2:

- What conditions are used to determine the appropriate type of graph?

Types of Graphs

- In this lab classroom, we will use 3 main types of graphs:
    1. Line Graph
    2. Bar Graph
    3. Pie Chart

- Each type of graph has a specific best use based on the data that was collected.

Line Graph

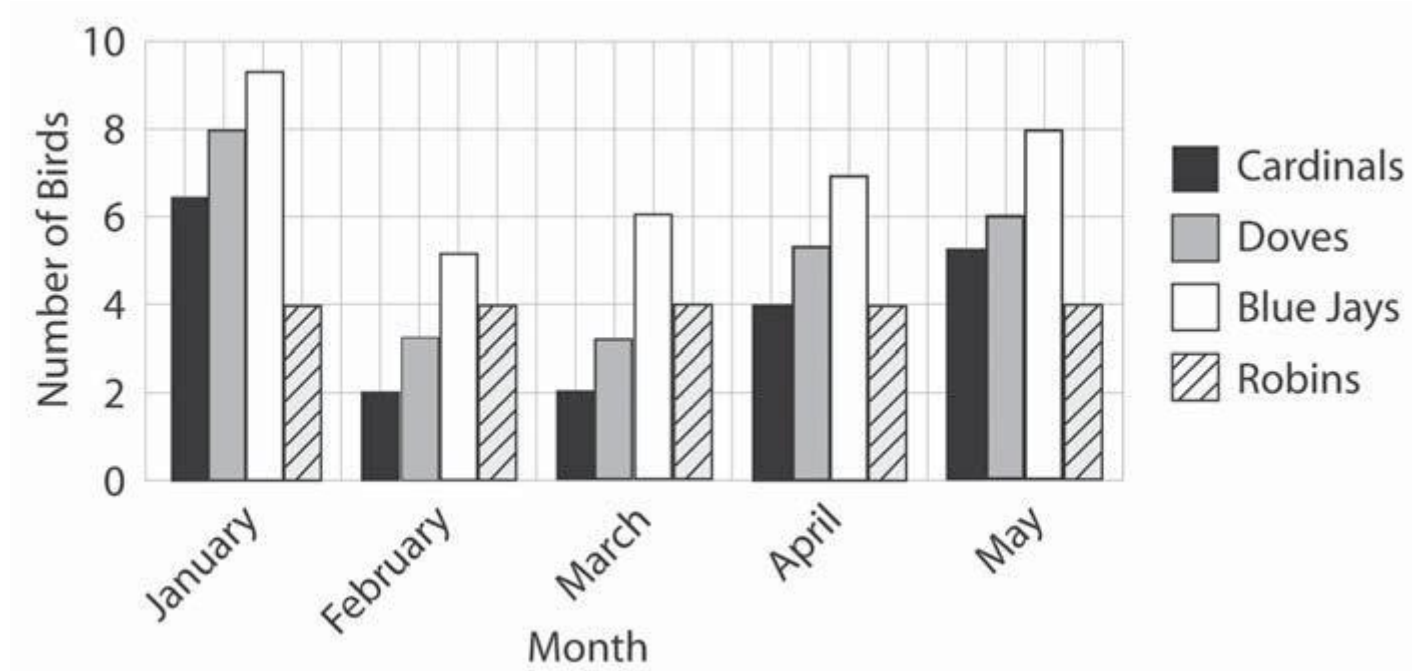**Bear Population in Emerald Forest**
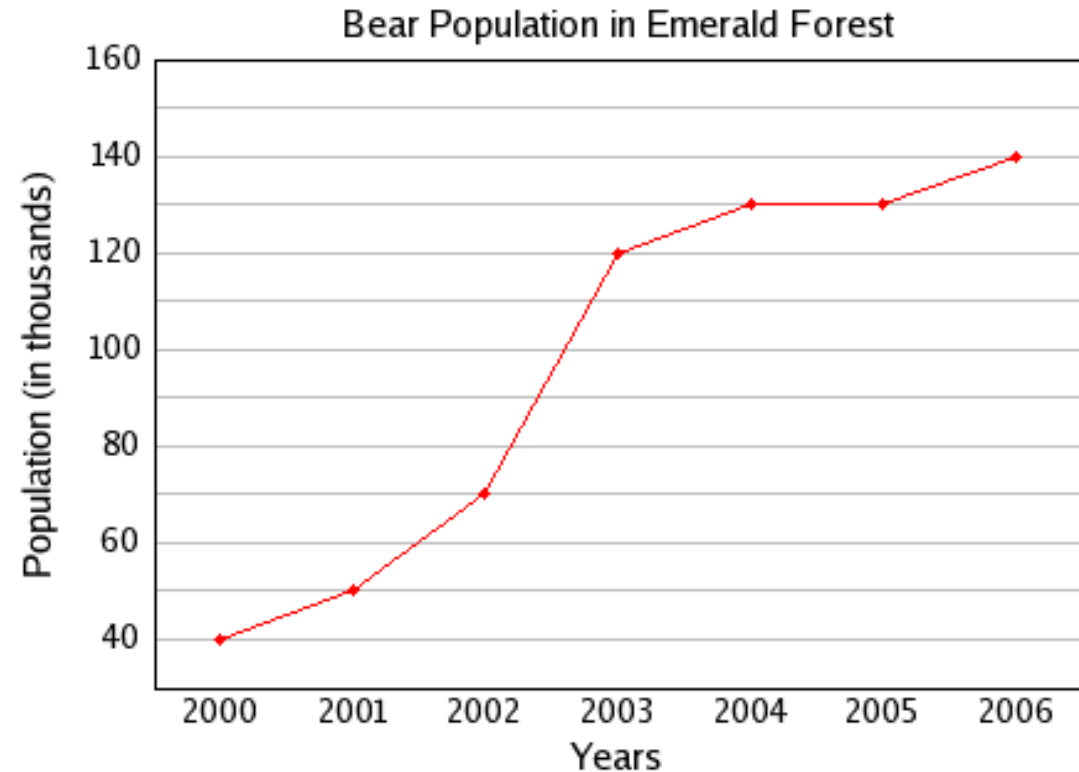
- Line graphs show how a data set is changing over some dimension (time, distance, temperature, etc.) so the points are connected.
  - X-axis shows the independent variable
  - Y-axis shows the dependent variable

Line Graph
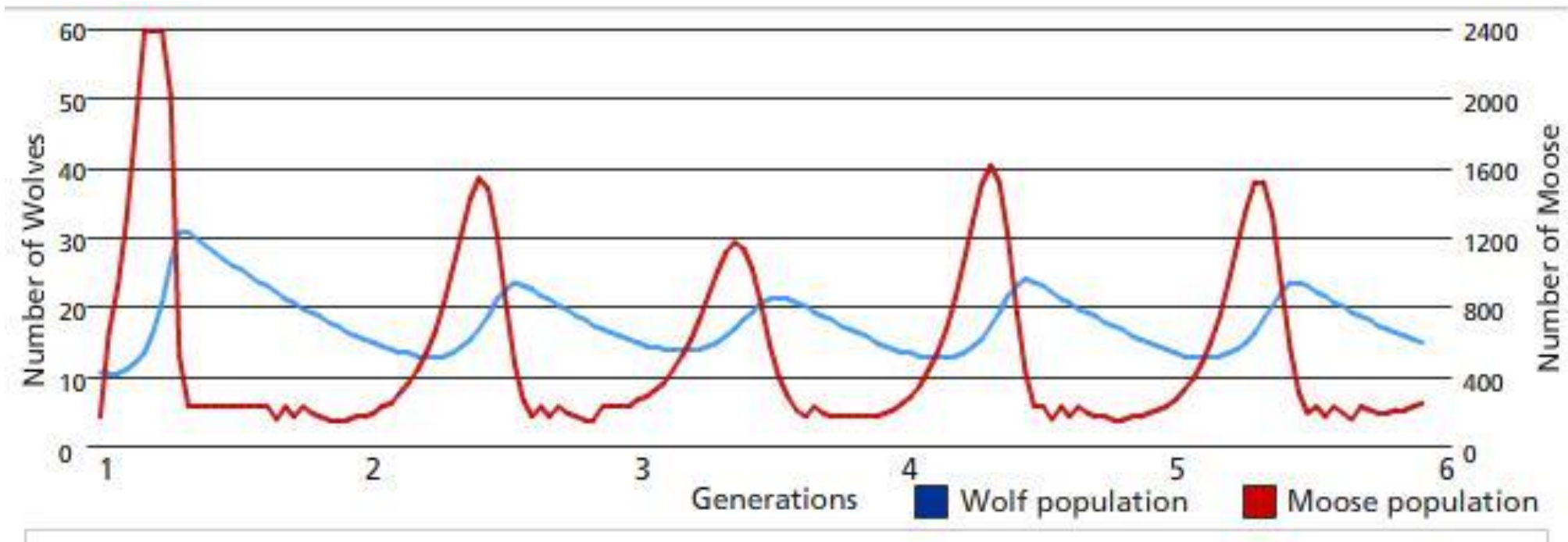
- Sometimes a scientist may need to compare multiple data sets at once, so the graph will show multiple lines
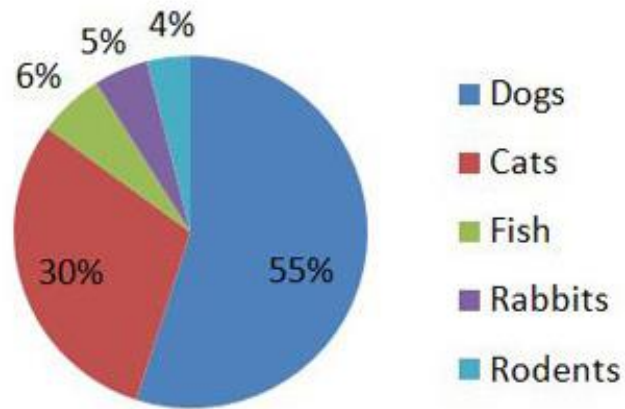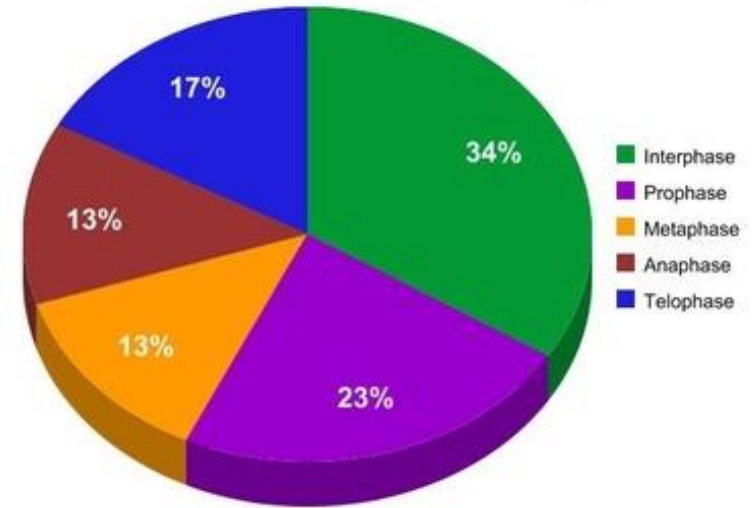
Bar Graph

- Bar graphs show comparison between different sets of data

- Typically it's not the act of changing that important, but the numbers at different times

Pie Chart

Pet Ownership

55% — Dogs
30% — Cats
6% — Fish
5% — Rabbits
4% — Rodents

Onion Root Tip Cell Cycle

34% — Interphase
23% — Prophase
13% — Metaphase
13% — Anaphase
17% — Telophase

- Pie charts show what percentage of the whole the different data sets belong to.
- Pie charts do not show changes over time.

Concept Mastery Questions

- What is the difference between independent and dependent variables?

- Why should you test only one unknown at a time?

- When do you want to display your data as a line graph? Bar graph? Pie chart?