Lesson 1: Variables and Graphing

Variables

- The things that are changing in an experiment are called variables. A ***variable*** is any factor, trait, or condition that can exist in differing amounts or types. An experiment usually has **three kinds** of variables: **independent, dependent, and controlled**.

- In a scientific inquiry, we speak of "**isolating variables**".

Comparing types of soil

- **Manipulated/Independent variable:** is the variable that is being changed or compared by the scientist.
- Example: **Type of Soil**
- This is represented on the **x-axis** of your graph.

Comparing Types of Soil

- **Responding/dependent variables** are the things that the scientist focuses his or her observations on to see how they respond to the change made to the independent variable.
- Example: **Height of Plant**
- This would be represented by the **y-axis of** your graph.

Comparing Types of Soil

- Experiments also have **controlled variables**. Controlled variables are quantities that a scientist wants to remain constant, and he must observe them as carefully as the dependent variables

- All other factors, or things that could be a variable, must remained controlled, or the same:
  - Pot Sizes, amount of water, sunlight, type of plant

- **Why?**

Other examples

- In which type of liquid will a golf ball sink the fastest?
  - Independent, dependent, control??
- Does getting more sleep help you get better grades?
  - Independent, dependent, control??

Try these

- Under which light will beans grow the tallest?
- Which design of paper airplane will glide the farthest?
- How does the amount of air pressure in a basketball affect how high it bounces?
- Does caffeine help you to type faster?

Labelling the x and y axis

- The ***x-axis*** shows the manipulated variable (also known as the "***independent variable***", it's the one that you control, change, or compare).

- The ***y-axis*** shows the responding variable (also known as the "***dependent variable***", it's the result, or what you measured, from the test).

- ***Practice!***

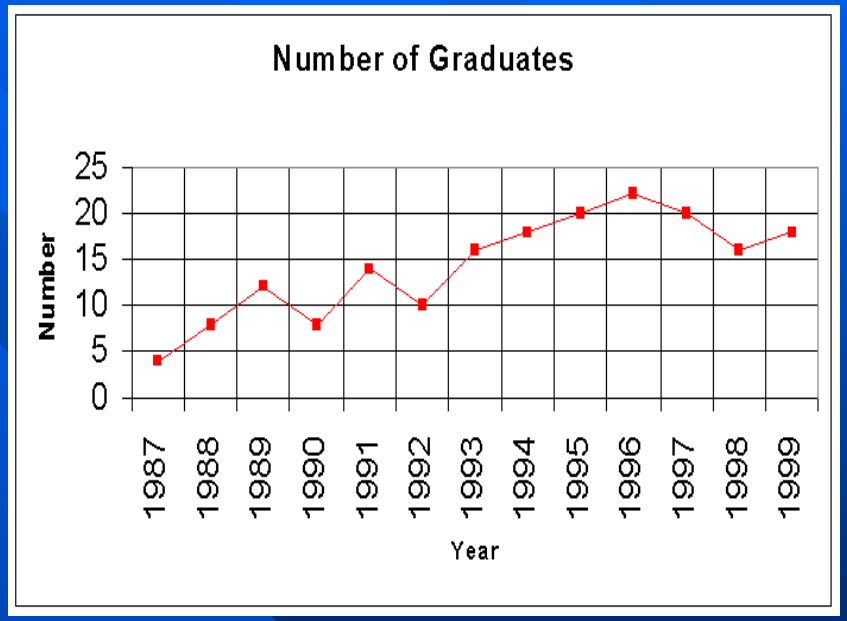
Determine range and scale

- How high do the numbers go? The values of each axis on the graph must include all the data collected.

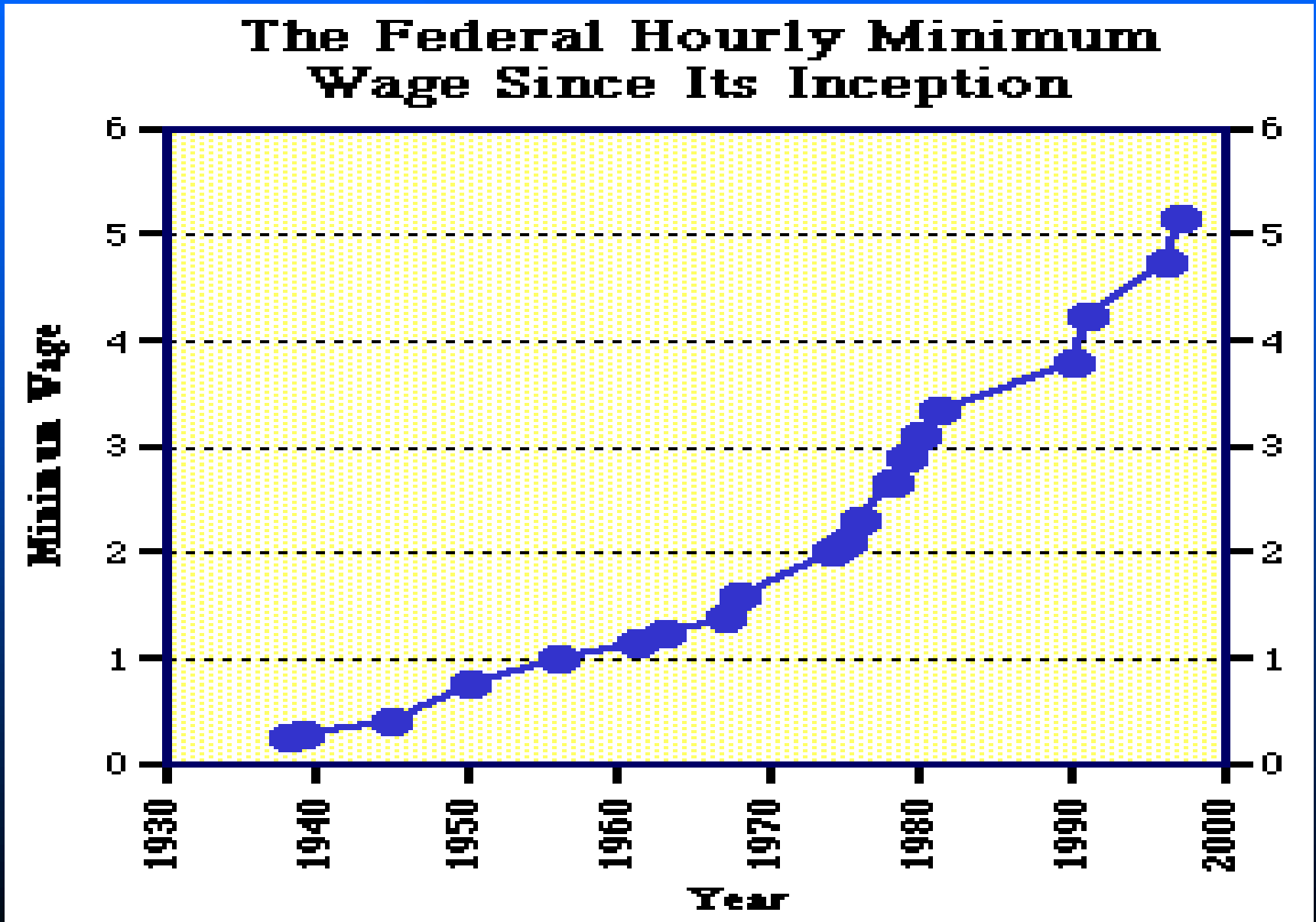
- Next we determine the scale we will use for each square on the graph.
  - This depends on space and the range used
  - All squares must be worth the same value!

Line Graph

- Line graphs are used when one variable (independent) affects another, which is the dependent variable.
- Useful for ***predicting trends***



What's your conclusion? Is minimum wage increasing or decreasing over time?

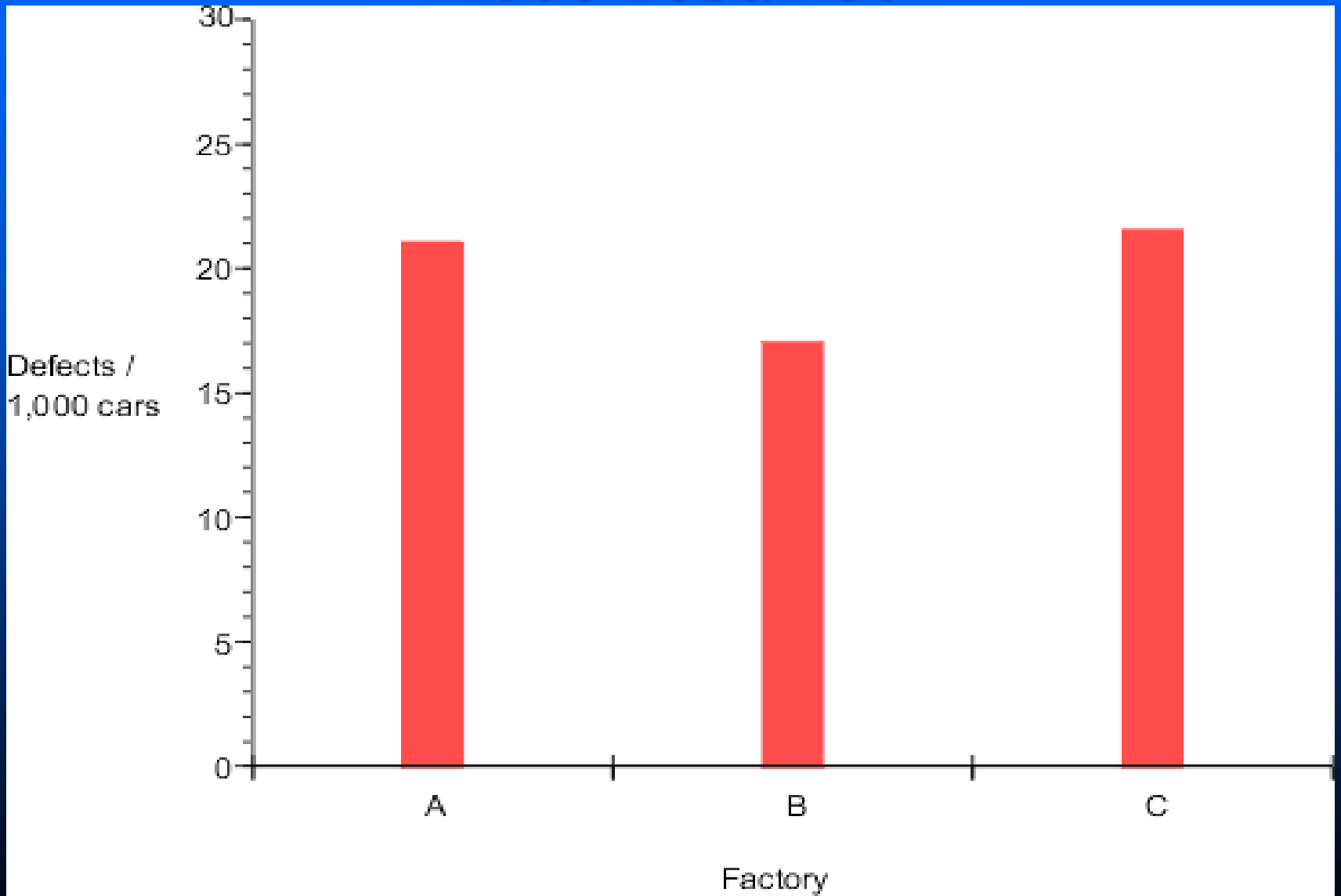


Bar Graph

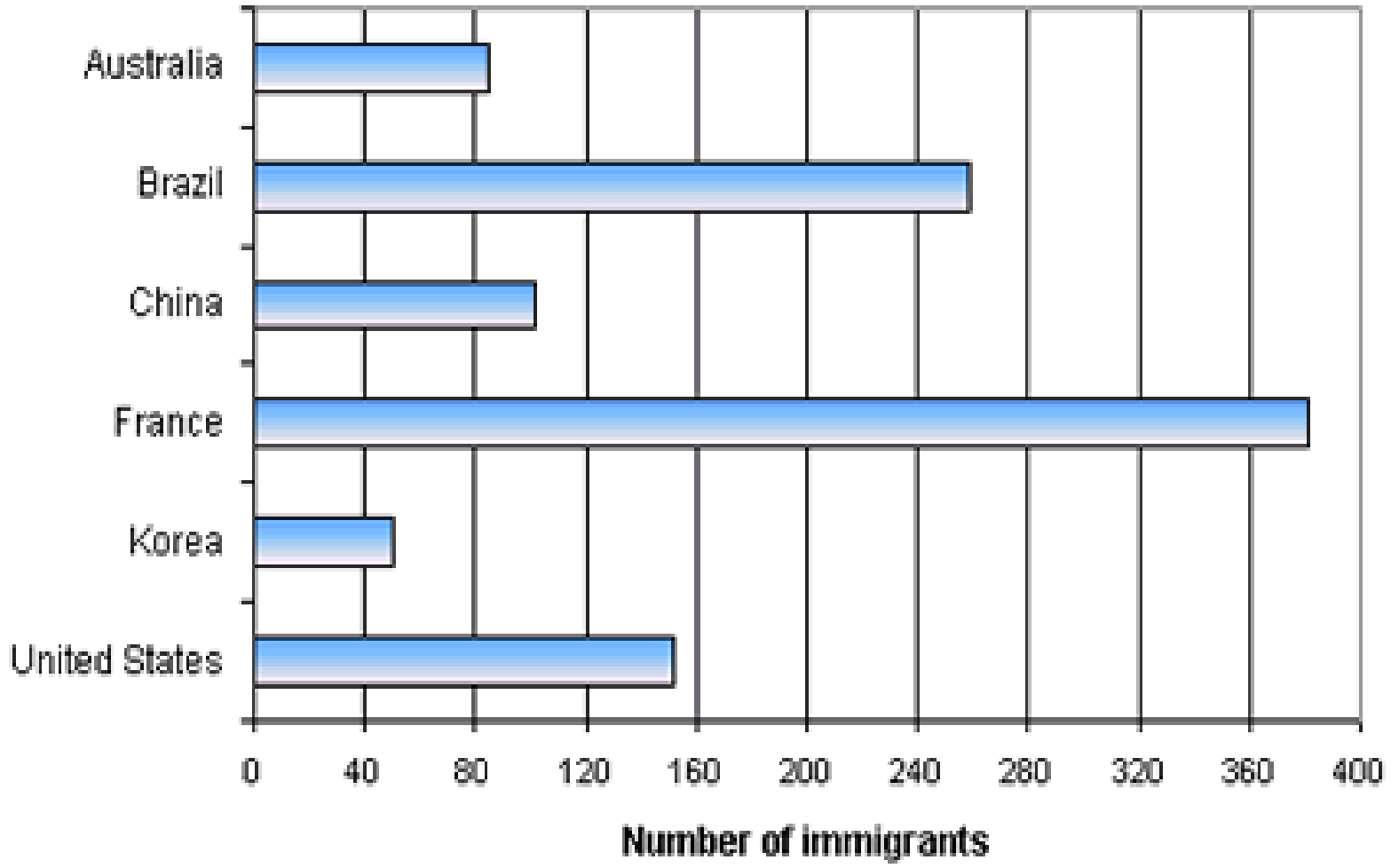
- The data for this graph are non-numerical for at least one variable. There are ***no dependent and independent variables***. Axes may be reversed to give a graph with the categories on the x axis.

- Bar graphs can therefore be drawn horizontally or vertically. This type of graph is very useful for ***comparing two or more similar items***.

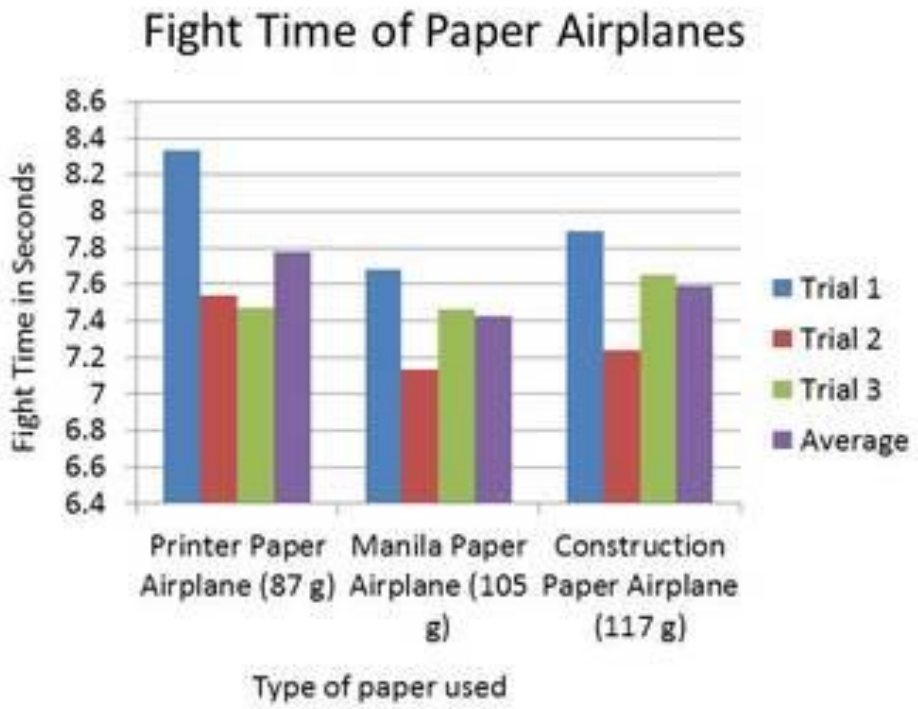
What is your conclusion from these results?



What question is being answered? Title?



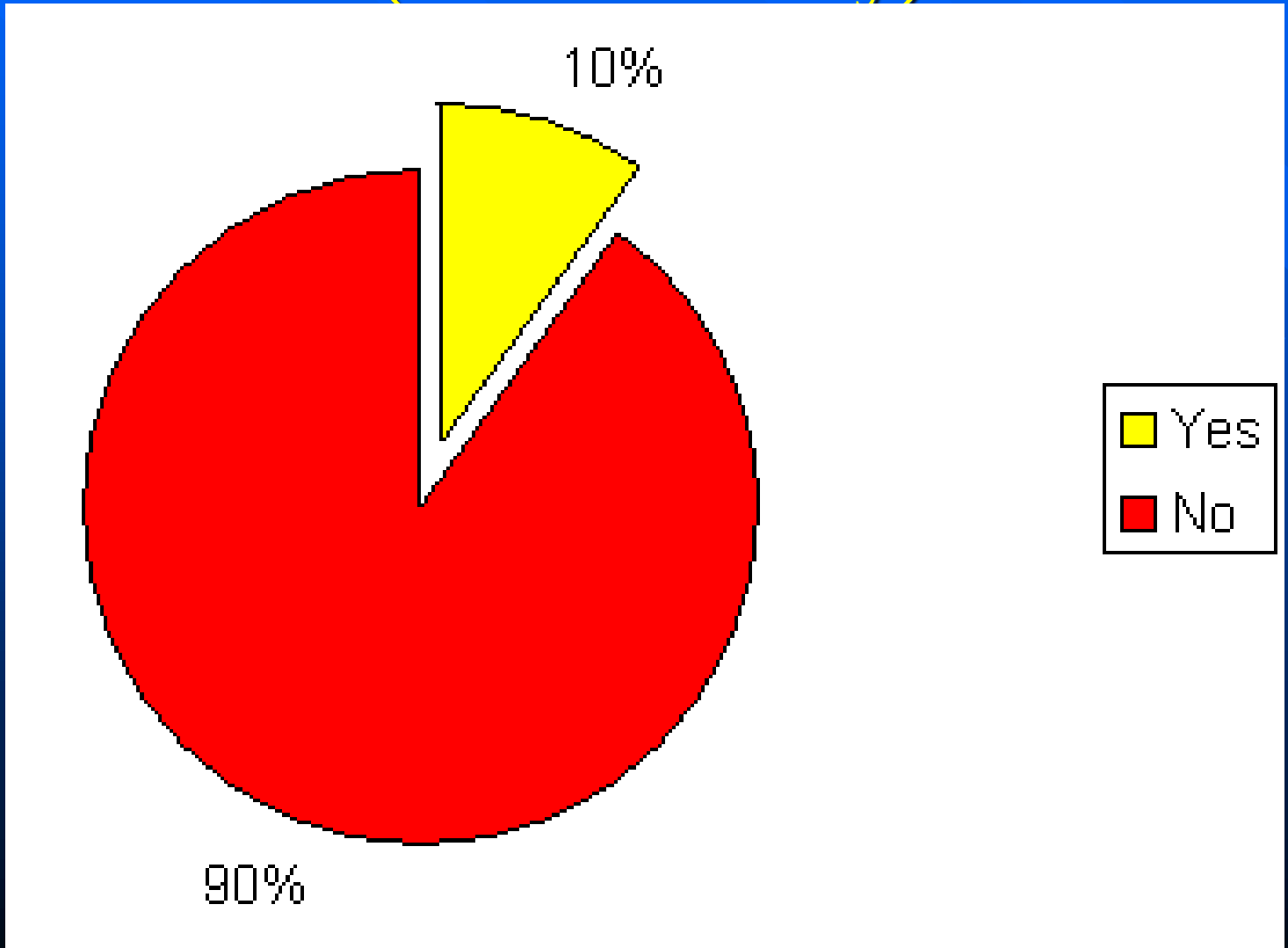
Paper Airplane experiment



Pie Graph (Circle Graph)

- As with bar graphs, pie graphs are used when the data for one variable are discrete (categories) and the data for the other variable are in the form of counts (**percentages** or proportions)
- A circle is divided according to the proportion of counts in each category.
- Not suitable for data sets with a very large number of categories (more than 6)

Should our school require students to wear uniforms? (student survey)



Music Preference for Young Adults (what's your conclusion?)