

**EXPERIMENT 2:****CORRELATING AEROSOL KNOWLEDGE AND CONSUMER USE****DIFFICULTY: MODERATE****BACKGROUND**

The Earth's upper ozone layer acts like sunscreen, or a shield that protects organisms on Earth from the dangerous ultraviolet radiation (UV rays) given off by the Sun. When certain chemicals are continually released into the atmosphere, their reaction with the upper ozone layer is destructive. For example, chlorofluorocarbons (CFCs), used during the 1960s and 70s as propellants in some aerosol products, caused significant damage to the Earth's upper ozone layer, reducing protection on Earth from harmful UV rays.

Fortunately, in light of this concern, many studies were conducted in the 1970s to learn more about protecting the Earth's upper ozone layer. As a result of increased awareness and concern, in 1978 the US banned CFC-producing agents and similar chemicals from most consumer aerosol products to help protect the Earth's upper ozone layer from further damage caused by CFCs. Many other countries were quick to follow the US.

The consumer aerosol products industry also addressed this ban by switching to non-CFC aerosol propellants that do not harm the Earth's upper ozone layer. However, many consumers continue to avoid aerosol products, holding to the belief that consumer aerosol products still damage the Earth's upper ozone layer.

**LEARNING GOALS**

1. The student will understand that consumer aerosol products no longer harm the Earth's upper ozone layer.
2. The student will develop and use an assessment quiz based on general atmosphere and aerosol knowledge.
3. The student will survey consumers to see how widely they use products with aerosol versus non-aerosol "pump" spray delivery.

3. The student will determine if there is a correlation between aerosol product use, and knowledge of atmosphere and aerosol product concerns.

**MATERIALS**

- CAPCO website quiz "Check your gray matter" You can find this quiz on CAPCO's website: <http://nocfcs.org/kids/quiz.htm> (20 questions on atmosphere, aerosol, and general content knowledge), or a similar quiz covering the same content in preferred evaluation format (paper quiz, online, etc.)
- Graphing materials

**PROCEDURE**

1. Determine what specified products will be included in the survey and use the same products for each survey administered. They should be products that are readily available in both aerosol and non-aerosol "pump" spray delivery, such as hairsprays, deodorants, colognes, perfumes, cleaners, etc.
2. For each household, give the quiz assessment to the same member of each household; for example, the female head of the household. Allow exactly the same amount of time for each quiz to be taken.

**[Note: Another valid method might be to give the quiz to all members of the household above a certain age, and average those scores into a "Household Average Score," rather than surveying just one member of the household.]**

3. Inventory the total number of aerosol vs. non-aerosol spray products as previously specified. This inventory may be house-wide, or the student may elect to inventory only a select room (kitchen, bathroom, etc.) for each household.

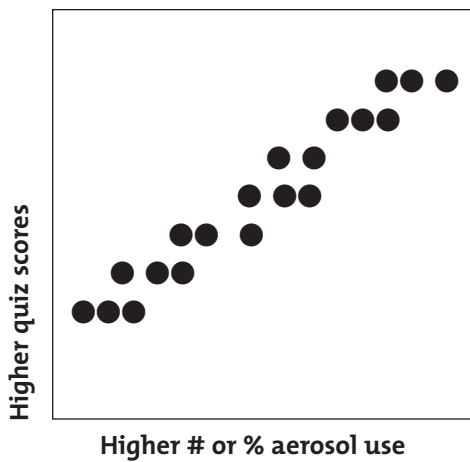
**DISCUSSION**

1. What was your original hypothesis regarding knowledge and number (or %) of aerosol delivery? One possible hypothesis might expect that the higher the knowledge score, the more aerosol products (or higher % of aerosol delivery products) found in that household.

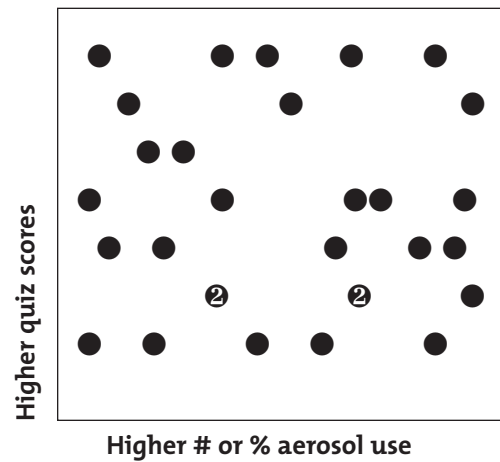
**EXTENSIONS**

2. From the data collected, make a scattergram (correlation graph) or line(s) graph plotting the quiz score on one axis and the number of products on the other axis. On this graph, the student may plot aerosol product data in one color, and non-aerosol spray data in another color as a two-line line graph. The student may elect to plot the aerosol vs. non-aerosol data as a percentage, i.e. what percent of spray products inventoried in each household is aerosol in form.

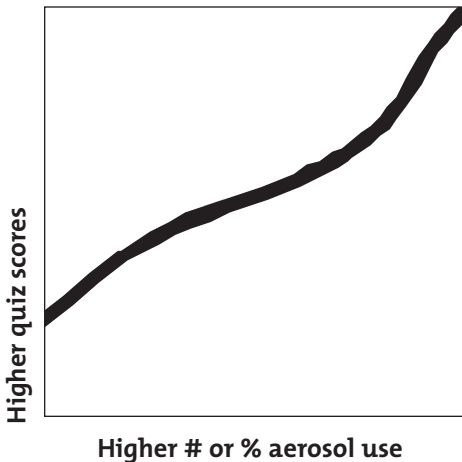
**Scattergram (correlation) showing positive correlation**



**Scattergram (correlation) showing no correlation**



**Single-Line graph**



**Double-Line (comparison) graph**

