**Barron’s Let’s Review Regents – Algebra II**

# Chapter 11: Statistics

## 11.1 Types of Statistical Studies

**Key Ideas**

Three ways to collect data for statistical study are , *observational study*, and *experiment*. *Bias* in a statistical study is when something about how the data are collected may have caused inaccurate results. Causes of this bias should be identified and, if possible, eliminated before collecting the data.

**Statistical Survey**

A survey is a question or series of questions that participants, also called subjects, in the study are asked to answer. The survey can have a simple yes/no question like “Do you like pistachio ice cream?” or a question with a numerical answer like “How much time did you spend on homework last night?” A survey is the simplest way of collecting data, but there are many ways that it can lead to bias.

The wording of the survey question can cause bias. For example, if the question says “Do you not hate pistachio ice cream?” rather than “Do you like pistachio ice cream?” the negative phrasing of the question could change the results even if the questions are supposed to mean the same thing.

The participants of the survey should be randomly selected, otherwise the results can also be distorted. The results of a survey about pop music, for example, will not be accurate if most of the people asked to complete the survey are under 20 years old. If the participants in the survey do not accurately reflect the total population, the survey has *selection bias*.

If the survey is voluntary, there is a chance that people who respond to the survey are more likely to answer the question a certain way. A survey that is conducted by text messaging, for example, might be answered more by younger people, causing bias in the results.

**Observational Study**

An *observational study* is like a survey. Instead of subjects being asked to answer questions, the person conducting the study observes the behavior of the participants and records the results. To learn about whether or not people like pistachio ice cream, the observer could go to an ice cream shop and watch what different people order. An important aspect of an observational study is that the person conducting the study cannot do anything that could interfere with or control what the subjects do.

An observational study could have bias if the subjects are not randomly selected. For example, if the ice cream shop observations happen during school hours, people under 18 will not be adequately represented.

**Experimental Study**

In an experimental study, the person conducting the study randomly chooses some of the subjects and exposes them to some kind of treatment. An example is a study to see if taking vitamin C prevents colds. Fifty-people are randomly selected and then, from those fifty, twenty-five are randomly selected to take vitamin C pills daily while the other twenty-five are not given the pills.

It is important in an experimental study to choose the group of people getting the treatment randomly. If there is some kind of bias in who receives the treatment, the experiment might lead to an inaccurate conclusion.