**Chapter 4.2: Experimental Design**

For each experiment below, identify the experimental units, explanatory variable, treatments, response variable, blocks (if applicable), and matched pairs (if applicable). Then outline a completely randomized experiment and explain how to carry out random assignment.

**Experiment #1:** A health organization wants to know if a low-carb or a low-fat diet is more effective for long-term weight loss. The organization decides to conduct an experiment to compare these two diet plans with a control group that is only provided with a brochure about healthy eating. Ninety volunteers agree to participate in the study for one year.

*Experimental units:*

*Explanatory variable:*

*Treatments:*

*Response variable:*

*Blocks (if applicable):*

*Matched pairs (if applicable):*

*Completely randomized design flowchart:*

*Explain how to carry out random assignment:*

**Experiment #2:** A men’s magazine set out to determine which of two brands of electric razor shaves closer (A or B). Researchers randomly assigned 50 male volunteers to one of two equal groups. The first group was given razor A and the second group was given razor B. The researchers measured how close the razor shaved. The next morning, the men were given the other razor and researchers measured how close the razor shaved. The difference in closeness of the shave was analyzed to see which razor shaves closer.

*Experimental units:*

*Explanatory variable:*

*Treatments:*

*Response variable:*

*Blocks (if applicable):*

*Matched pairs (if applicable):*

*Completely randomized design flowchart:*

*Explain how to carry out random assignment:*

**Experiment #3:** A cell phone company is considering two different keyboard designs (A and B) for its new line of cell phones. Researchers would like to conduct an experiment using subjects who are frequent texters and subjects who are not frequent texters because they believe that there may be an important difference in frequent texters’ and novice texters’ keyboard accuracy. The researchers will ask 100 frequent texters and 200 novice texters to text several different messages in 5 minutes. The researchers are interested in comparing the number of correctly typed words in 5 minutes for keyboard design A and B.

*Experimental units:*

*Explanatory variable:*

*Treatments:*

*Response variable:*

*Blocks (if applicable):*

*Matched pairs (if applicable):*

*Completely randomized design flowchart:*

*Explain how to carry out random assignment:*

**Experiment #4:** The progress of a type of cancer differs in women and men. Researchers want to design an experiment to compare three therapies for this cancer (A, B, and C). They recruit 500 male and 300 female patients who are willing to serve as subjects. Each subject is randomly assigned to one of the three cancer therapies. At the end of the study, the cancer progression in each subject is measured and analyzed by therapy type.

*Experimental units:*

*Explanatory variable:*

*Treatments:*

*Response variable:*

*Blocks (if applicable):*

*Matched pairs (if applicable):*

*Completely randomized design flowchart:*

*Explain how to carry out random assignment:*