Designing Experiments and Observational Studies

Match the terms in the box below to their corresponding statement or definition. You may use terms more than once, and you may not use some at all.

Observational study	**Experiment**	**Randomization**	**Subject**
Explanatory variable	**Response variable**	**Dependent variable**	**Independent variable**
Confounding variable	**Control group**	**Replication**	**Placebo**
Placebo effect	**Single-blind**	**Double-blind**	**Matched-pair design**
Block design	**Repeated measures design**	**Retrospective study**	**Prospective study**

_____: A scenario in which researchers observe or measure the participants but do not assign any treatments or conditions.

_____: A variable that both affects the response variable and is also related to the explanatory variable.

_____: An experiment in which the participant does not know which treatment they have been assigned, but the investigator does.

_____: An experimental design in which individuals are first matched based on important characteristics and then each member of a pair receives a different treatment.

_____: A type of study which utilizes data from the past.

_____: An experimental design in which the same subject receives all treatments in a specified order.

_____: A variable which may explain or cause a difference in another variable. (Two possible answers)

_____: A scenario in which participants are assigned to a certain treatment.

_____: An experiment where the investigator does not know which treatment a subject has been assigned, but the subject does.

_____: A group of individuals who is treated identically in all respects except that they receive no treatment.

_____: A phenomenon in which people who have not had treatment applied still report feeling the effects of the treatment.

_____: An experimental design in which the same individual is measured twice under different conditions.

_____: A type of study which follows participants into the future.

_____: The only scenario in which you can infer a cause-and-effect relationship!

1. Twenty students agreed to participate in a study on colds. Ten were randomly assigned to receive vitamin C, and the remaining 10 received a tablet that looked and tasted like vitamin C but in fact contained only sugar and flavoring. The students did not know whether they were taking vitamin C or not, but the investigators did. The students were followed for 2 months to see who developed a cold and who didn't. Explain whether each of the following terms applies to this experiment:

   a) Placebo

   b) Replication

   c) Double-blind

   d) Single-blind

   e) Prospective study

   f) Control group

   g) Matched pairs

   h) Randomization

2. Twenty grocery stores are participating in an experiment to compare the effectiveness of two methods for displaying a product. The response variable will be the number of items of the product sold during a 1-week period.

   a) Describe a completely randomized design for this experiment.

   b) Describe a matched-pairs design for this experiment.

3. Give an example of a scenario in which an observational study would have to be used instead of a randomized experiment.

4. Give an example of a scenario in which either an observational study or a randomized experiment could work. Describe how you would set up each, and then discuss the pros and cons of both methods.