



The graph above shows the results of a controlled experiment designed by a scientist to determine the effect of magnetic field strength on the growth of sunflower plants. 500 young sunflower plants were randomly assigned to the control or experimental group. In the control group, the scientist grew 250 sunflower plants under normal local geo-magnetic field conditions (30 microteslas). In the experimental group, the scientist grew 250 sunflower plants identically except under a lower geomagnetic field (20 microteslas). Based on the results of this experiment, which conclusion is NOT valid?

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- A Sunflower plants grown under lower magnetic field conditions were more likely to weigh more than sunflower plants grown under normal magnetic field conditions.
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- B There is evidence of an association between the strength of magnetic field and height in sunflower plants.
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- C Sunflower plants grown under lower magnetic field conditions were more likely to be taller than sunflower plants grown under normal magnetic field conditions.
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- D Members of the control group were more likely than members of the experimental group to grow less than 100 inches.

Data Collections and Conclusions

A researcher wants to conduct a survey to gauge United States (US) voters' opinions about the US Congress. Which of the following should NOT be a component of this survey?

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- A The researcher collects data from the survey takers.
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- B The researcher analyzes data from the survey takers.
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- C The researcher distributes the survey to 10,000 randomly selected US citizens aged 18 and older.
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- D The researcher distributes the survey to 10,000 residents of a Washington D.C. neighborhood.
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A scientist wants to collect data about the effects of gravity on the growth of soybean plants. To test her hypothesis that soybeans grow better in a zero-gravity setting, she randomly assigns the plants into one of two groups. The first group is grown in typical soybean growing conditions in a greenhouse on earth, and the second group is grown in a zero-gravity, yet otherwise identical greenhouse in a space station. Which of the following is the best description of the research design for this study?

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- A Controlled experiment
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- B Observational study
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- C Sample Survey
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- D None of the above
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Data Collections and Conclusions

In order to determine whether children who have just watched cartoons will perform better on cognitive tasks than children who have not just watched cartoons, researchers randomly divided 60 preschoolers into two groups. For nine minutes, one group watched a rapid-paced cartoon, while the other group did not watch anything and did a quiet activity. They then administered standardized tests to determine the immediate impact of the children's previous nine minutes of activity. Which of the following is the best description of this type of research design?

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- A An observational study, a study in which investigators observe subjects and measure variables of interest without assigning treatments to the subjects.
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- B A controlled experiment, a study in which an investigator separates subjects into a control group that does not receive a treatment and an experimental group that receives a treatment, and then observes the effect of the treatment on the experimental group.
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- C A sample survey, a study that obtains data from a subset of a population, usually through a questionnaire or interview, in order to estimate population attributes.
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- D A census, a study in which data is collected from every member of a population.
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A researcher representing a city government wants to measure public opinion about recycling by asking 1,000 randomly selected residents a series of questions on the subject. Which of the following is the best description of the research design for this study?

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- A Observational study
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- B Sample Survey
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- C Controlled experiment
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- D None of the above
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