

2003 AP® STATISTICS FREE-RESPONSE QUESTIONS (Form B)

3. A study was conducted to determine if taking vitamin C reduces the occurrence of the flu. The study was conducted using 808 student volunteers who did not take a flu shot. The subjects were randomly assigned to one of two groups: a treatment group who received 1,000 milligrams of vitamin C daily or a control group who received a placebo flavored to taste like the vitamin C treatment. All participants were monitored to ensure that they adhered to their assigned treatment on a daily basis throughout the period of the study. At the end of the flu season, each subject's medical record was reviewed by a physician to determine whether he or she had contracted the flu during the period of the study. The physician did not know which treatment each subject received. The results of the study are shown in the table below.

	Flu	No Flu	Total
Placebo	331	74	405
Vitamin C	302	101	403
Total	633	175	808

- a) Is this study an experiment or an observational study? Explain your answer.
- b) If a student volunteer is selected at random from those students in the study, what is the probability that they contracted the flu?
- c) Given that a student took Vitamin C, what is the probability that they contracted the flu?
- d) Based upon your answers in part b & c, are "contracting the flu" and "taking Vitamin C" independent of each other? Explain.
- e) A health expert believes that Vitamin C reduces the occurrence of the flu in the population of students who would volunteer for such a study. State the name of the significance test and the null and alternative hypothesis that the health expert could have used to assess his claim.
- f) Assume that the conditions for running this test are met, the test resulted in a p value= 0.0096. Based upon the p value, what conclusion should the health expert make? Explain.
- a) Is this study an experiment or an observational study? Explain your answer.

This is an experiment since the health experts imposed treatments of vitamin C and a placebo and subjects were randomly assigned to either group.

b) If a student volunteer is selected at random from those students in the study, what is the probability that they contracted the flu?

The probability of getting the flu is 0.783.

 $P(flu) = \frac{633}{808} = 0.783$

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