EXAMPLE 1: A research satellite runs on a set of batteries. It can run on only one battery, but it runs best if more than one battery is used. The variance σ^2 of the lifespan of the batteries is important.

- Why would it be a problem if σ^2 is too small?

- Why would it be a problem if σ^2 is too large?

A random sample of 22 batteries is taken from a batch of batteries that is produced. The variance for the lifespan of this sample of batteries was found to be 14.3 months^2. Engineers will use batteries that have the optimal variance of 15 months^2 and claim that this batch of batteries is suitable for use in the satellite. Test this claim with a .05 significance level.

EXAMPLE 2: A particular standardized test is scored out of 800 points. From past experience, it is determined that a standard deviation of 100 points is considered good. If the standard deviation is too small, then the test may be considered too hard (<u>everyone did poorly</u>) or too easy (<u>everyone did well</u>) and thus, the test <u>would not accurately distinguish between poor, good, and excellent scores</u> . Each year a preliminary exam is given to 30 randomly selected students to test the quality of the exam. The standard deviation for the sample is 81 points. Test the claim that the standard deviation for the the exam is less than 100 points. Use a .10 significance level.