Steps in hypothesis testing:

1) Propose a ***scientific question*** or hypothesis.

2) Phrase question or hypothesis statistically, in terms of ***null*** and ***alternative hypotheses*** (H_0 and H_a).

3) Collect ***random sample(s)*** of data from population (or samples from multiple populations).

4) Calculate ***descriptive statistics*** from sample(s).

5) Determine ***how compatible data are with results expected under H_0***.

- Calculate ***test statistic*** from the data.
- Compare test statistic to ***null distribution***.
- ***Assign P-value*** (probability of data or more extreme data given H_0 is true).

6) Make a ***decision regarding H_0***.

- If data ***inconsistent*** with H_0, reject H_0.
  - Reject H_0 if *P*-value $\leq \alpha$.
- If data ***consistent*** with H_0, do not reject H_0.
  - Do not reject H_0 if *P*-value $> \alpha$.

7) ***Answer the original scientific question***, and ***report the results of the study***.

- Answer question in words.
- Report descriptive statistics, sample size, test statistic, and *P*-value.

		Reality	
		H_0 True	H_0 False
Decision	Reject H_0	Type I error Pr(R|T) = α	Correct decision Pr(R|F) = 1 – β = Power of the test
	Do not reject H_0	Correct decision Pr(not R|T) = 1 – α	Type II error Pr(not R|F)= β