

Over the course of learning about hypothesis testing, students get very good at using the p-value to determine whether to reject or fail to reject the null hypothesis. However, far fewer students understand what the p-value represents. But that's okay! It's a hard concept. This activity will hopefully make things clearer for you. Please keep this sheet face up, and don't turn this page over until your instructor tells you to.

1. In a hypothesis test we can use the p-value to make a decision about the null hypothesis. Define what the p-value is in your own words.

2. Your instructor is going to have students draw a card from a standard deck, and see whether they get the desired color. How often would you expect someone to win this game?

3. Let's say we draw sixteen cards from the deck, with replacement.

a. How many would you expect to be the desired color?

b. Are we guaranteed to get exactly that many? Why or why not?

4. Did you make an initial assumption about the population of the cards? What assumption did you make?

5. What is the probability of NOT getting your desired color? Write the answer as a fraction and a decimal.

$P(\text{not getting the desired color once}) =$

$P(\text{not getting the desired color four times}) =$

$P(\text{not getting the desired color twice}) =$

$P(\text{not getting the desired color five times}) =$

$P(\text{not getting the desired color three times}) =$

$P(\text{not getting the desired color six times}) =$

5. Based on what you observed, can you be sure that your initial assumption is false? Have you proven it was false? If not, why not?

6. Even though you have not proved it was false, are you convinced it was false? Why or why not? If so, at what point did that happen?

7. Do you believe it is possible to be convinced without seeing the entire deck? Why or why not?

Takeaway: The p-value is the _____ associated with the test statistic, measuring the chance of getting results at least as strong as yours if H_0 is true.

The **larger/smaller** (circle one) your p-value, the less likely your results were to have occurred, and the more evidence you have against H_0 .