Chi Squared practice problems

**DEGREES OF FREEDOM**: One less than the total possible outcomes Deg of Freedom

In a coin toss, there are 2 possible outcomes (heads or tails)………………………..1

In a dihybrid cross between two heterozygous parents, there are 4 possible phenotypes, which we expect to be in 9:3:3:1 ratio …………………………………………………………………..3

If you’re rolling dice, the possible outcomes are 6, for each side of the dice………..5

**CRITICAL VALUES TABLE**: We usually use the values for **p=0.05**, which loosely means we’re 95% sure of our data. If we wanted to be even more sure, we would have to go to an even smaller p value, and so our data must be even “tighter” with what we expect to find.

**“ACCEPT THE NULL HYPOTHESIS”:** This is what we say if our Chi-Squared (x2) value is LESS THAN the critical value. This means “THERE IS NO SIGNIFICANT DIFFERENCE BETWEEN OUR OBSERVED (MEASURED) RESULTS, AND THE EXPECTED RESULTS.” We can think of this as “accepting” our data.

**“REJECT THE NULL HYPOTHESIS”:** This is what we say if our Chi-Squared (x2) value is MORE THAN the critical value. This means “THERE IS A SIGNIFICANT DIFFERENCE BETWEEN OUR OBSERVED (MEASURED) RESULTS, AND THE EXPECTED RESULTS.” We can think of this as “rejecting” our data, or better, that there is something affecting our results.

1. A zookeeper hypothesizes that changing the intensity of the light in the primate exhibits will reduce the amount of aggression between the baboons. In exhibit A, with a lower light intensity, he observes 36 incidences of aggression over a one month period. In exhibit B, with normal lights, he observes 42 incidences of aggression. Should he support or reject his hypothesis?
2. At a high school, students can choose to enter one of three doors. Custodians noticed that door #3 was always getting broken and suggested that more students use that door because it has a hands-free opener. Science minded students counted the number of students entering each door to see if the custodians were right. Door #1 had 60students enter | Door #2 had 66 students enter | Door #3 had 80 students enter. Were the custodians right?
3. A scientist predicts that the kittens born with a congenital birth defect will be 25% based on the hypothesis that it is caused be a recessive gene in that breed of cat. After surveying several litters, he found that 44 out of 125 kittens had the defect. Is his hypothesis correct?

1. A student makes a monohybrid cross with Drosophila (fruit flies). She crosses two heterozygotes for the white eye. Ww x Ww. She expects to see a 3:1 phenotypic ratio of Red eyes (WW and Ww) to white eyes (ww) - this is her null hypothesis. She rears the next generation through to adult flies and counts the following numbers: White eyes 210Wild type (red eyes) 680Perform a chi square analysis on these results and find out if it is close enough to 3:1 to fail to reject her null hypothesis. Make sure to show all work and explain your conclusions.
2. In a study of the effectiveness of an antipsychotic drug, patients treated with the drug were compared to patients receiving a placebo. In terms of the number relapsing, 698 of 1,068 patients relapsed after taking the placebo while 639 out of 2,127 patients relapsed after taking the antipsychotic drug. Test the prediction that the antipsychotic is significantly more effective in preventing relapse than the placebo.