GENE LINKAGE - GENE MAPPING PROBLEM

You are working with a hypothetical fly and have found color and wing mutants. Preliminary work indicates that the mutant traits are recessive and the associated genes are not sex-linked, but beyond that you have no information. You first look at 2 genes, each with two alleles: "B or b" for body color and "W or w" for wing surface. The red body phenotype is dominant to the yellow body phenotype and smooth wings are dominant to crinkled wings.

a) You cross a true-breeding yellow-bodied, smooth-winged female with a true-breeding red-bodied, crinkle winged male. What will be the phenotype(s) of the F1 progeny?

b) You cross several pairs of F1 siblings.

i) What ratio of phenotypes do you expect in the offspring?

ii) The actual data is shown below. Does this date match your expectation? It's close, right? Perform a Chi-square analysis on this data.

**body wing surface Number**

red smooth 310 yellow smooth 142 red crinkled 131 yellow crinkled 23

c) To determine the recombination frequency between these two genes (the color gene B and the wing gene W), you perform several crosses where you cross an F1 from part (a) with a yellow-bodied, crinkle-winged fly. You get the following results. What is the distance between the genes for body color and wing surface in map units?

**body wing surface Number**

red smooth 396 yellow crinkled 404 red crinkled 102 yellow smooth 98

d) Draw the chromosome with the genes spaced appropriately.