

Biology 131 Practice Linkage Problems

1. Given: two loci, K and L, with complete dominance at each locus. Let's call the possible phenotypes with respect to each of these loci **K** and **k** and **L** and **l**.

(a) Suppose that:

phenotype **Kl** is crossed with phenotype **kL** -- both true breeding lines

What is the genotype and phenotype of the F_1

(b) Next, a testcross of the F_1 (above) yields the following results, by phenotype:

KL 441
Kl 4423
kl 421
kL 4715

(i) Are loci **K** and **L** linked?

(ii) If so, what is the crossover frequency?

(c) Using "chromosome notation" (a line with loci on it, as used in lecture) diagram the genes for:

(i) the original parental lines

(ii) the F_1

(iii) the gametes of the F_1 individuals

(iv) the gametes of the testcross individuals

2. Linkage and Recombination (a) (Easy). Suppose that you find the following recombination frequencies. Draw a correct linkage map, including distances between adjacent loci:

Locus	Recombination Frequency
A to B	0.05
A to C	0.45
B to C	0.40

(b) (Harder) Draw a correct linkage map, including distances between adjacent loci, for the following recombination data:

Locus	Recombination Frequency
A to E	0.5
A to B	0.4
B to E	0.5
A to C	0.3
C to E	0.2
B to C	0.5
A to D	0.1

D to E	0.5
B to D	0.3
A to F	0.5
B to F	0.5
C to F	0.5
D to F	0.5
E to F	0.5

(c) Are all of these loci necessarily on the same chromosome? Explain.