Name _____ Course/Section_____

Date _____ Professor/TA _____

Activity 15.2 How can the mode of inheritance be determined experimentally?

Outline the experimental crosses you would need to make to solve each problem.

1. Three new traits have been discovered in a population of *Drosophila*:

- Tapping (a behavioral mutant in which the fly taps one foot constantly)
- Single stripe (a pigmentation change that leads to a long stripe down the fly's back)
- Angular (causes angular bends in bristles that are normally straight)

The positions of the three genes on the chromosomes are unknown. Given two pure breeding (homozygous) lines and using an initial cross of normal, normal, normal females with tapping, single stripe, angular males, describe the appropriate genetic experiments needed to establish whether any of these traits are caused by genes that are:

a. Autosomal or sex-linked

b. Linked on the same chromosome or unlinked

2. A genetics student chose a special project involving a three-gene cross to check the relative positions and map distances separating three genes in *Drosophila* that she thought were all on the third chromosome. To do this, she mated *Drosophila* females that were homozygous for the recessive genes *cu* (curled), *sr* (striped), and *e* (ebony) with males that were homozygous for the wild type, cu^+ (straight), sr^+ (not striped), and e^+ (gray). She then mated (testcrossed) the F_1 females with homozygous recessive curled, striped, ebony males.

Here are the phenotypic results of the testcross:

straight, gray, not striped	820
curled, ebony, striped	810
straight, ebony, striped	100
curled, gray, not striped	97
straight, ebony, not striped	80
curled, gray, striped	90
straight, gray, striped	1
curled, ebony, not striped	2
Total	2,000

a. How are the three genes arranged on the chromosomes?

b. What evidence allows you to answer the question in part a?

c. If any of the genes are linked, how far apart are they on the chromosome? How can you determine this?