Quiz 4 Key
BI-102, Winter '04-'05, Dr. C. S. Tritt

Each of the following three problems is worth the same amount. Answer each question completely but succinctly. Use the amount of space provided as a guide to how detailed to make your answer.

1. Explain the difference between an individual's *phenotype* and *genotype*.

Phenotype refers to an individuals observable characteristics (often, but not necessarily, their physical appearance). Genotype refers to an individuals genetic make-up (combination of alleles). An individual's phenotype is a manifestation of his or hers genotype (possibly influenced by environmental factors).

2. A man with type A blood and a woman with type B blood have three children. The blood types of the children are A, AB, O. What are the most likely genotypes of the parents and each child (use standard notation or define the meanings of your symbols). For full credit, briefly explain the thinking you used to arrive at your answer.

Hypothesize that the man in I^Ai and the woman is I^Bi (using standard notation). Then the Punnett square for the possible offspring is:

	I^A	i
I^B	I^AI^B (AB)	I^Bi (B)
i	I^Ai (A)	ii (O)

This is consistent with the observed blood types of the children, so accept the hypothesis.

3. Imagine you live on a farm. You buy a black roster from one neighbor with a flock of true breeding black chickens. You buy 3 white hens from another neighbor with a flock of true breeding white chickens. When you mate your new roster with your new hens, all the resulting F_1 generation chickens are gray. The next summer, you self cross the F_1 to produce an F_2 generation consisting of 102 black, 199 gray and 99 white chickens. Based on these results, what would you conclude about the dominance relationship between the black and white color traits? Explain your thinking (probably using a Punnett square) for full credit.

Hypothesize that the Black and White alleles (call the C^B and C^W, respectively) are incomplete dominance (accepted codominance, equally dominant, both dominant) such that C^BC^B individuals are black, C^WC^W are white and C^BC^W are gray. The following then represents the crosses described in the problem:

P generation: C^BC^B (black) × C^WC^W (white)
F_1 generation: C^BC^W (gray)
F_2 generation:

	C^B	C^W
C^B	C^BC^B (black)	C^BC^W (gray)
C^W	C^BC^W (gray)	C^WC^W (white)

This is consistent with the observed offspring, so accept the hypothesis.