

Name:  
Period:  
Date:

# **A.P. Biology Genetics Problem Set II**

## **Mendelian Genetics: Monohybrid and Dihybrid Crosses**

- ◆ After reading a problem, translate words into symbols. ("Let B = Brown eye allele")
- ◆ Use plenty of paper and write, write, WRITE! Only then can ideas take form.
- ◆ Review the meanings of genetics vocabulary the moment you come across a term that you don't know the precise meaning of.
- ◆ Never ASSUME! Work each problem out.

ALL WORK MUST BE SHOWN FOR CREDIT, Please attach your scratch paper, number the problems and circle your answers.

### **Monohybrid**

1. Cats with genotype TT have long tails, Tt medium-length tails, and tt short tails. A cat with medium length tail mates with a short tailed cat. (Incomplete Dominance) What length tails will their kittens have?
2. Mrs. Webber and Mrs. Jones have babies the same day at General Hospital. The nurse presents Mrs. Webber with baby Mike, and Mrs. Jones receives baby Tony. But Mrs. Jones begins to suspect that Tony is not her real son. Had the two babies been accidentally switched? Both sets of parents demand blood tests: Mr. Webber, type A; Mrs. Webber, type B; Mr. Jones, type A; Mrs. Jones, type A; Baby Mike, type O; Baby Tony, type B. Which baby belongs to which parents? (Codominance)
3. In one strain of mice, gg = gray fur, Gg = yellow fur, and GG = a mouse that dies as an embryo and is spontaneously aborted. Describe the litter (phenotypes and in what ratio) resulting from the mating of two yellow mice. (A lethal!)
4. In goats the following genotypes and phenotypes are seen:  
C1C1 = red coat, C2C2 = white coat, and C3C3 = black coat. Moreover,  
red goats x white goats given roan-colored kids (roan is a reddish color),  
red goats x black goats gives all red kids  
black goats x white goats gives all black kids.

(Don't be confused by this new way to write alleles – instead of big C or little c, subscripts are used – C1 or C2, etc.) Summarize the dominance relationships with respect to these 3 alleles. Here's a start: "C3 is dominant to C2..."

5. Albinism results from the failure to make the pigment melanin. It is an enzyme-deficiency disease, transmitted as a recessive allele. The metabolic pathway to make melanin has several enzyme-catalyzed steps. In 1952 it was reported that two albino persons had married and had 3 normally pigmented children. How is this explained?
6. In *Drosophila*, vestigial wings (vg) is recessive to normal or wild type wings (+). This is an autosomal trait. If a homozygous vestigial fly is mated to a heterozygous normal fly, what will the wings of their progeny be like? Use this notation (+ and vg).
7. In crested ducks (feathers on head form a crest), when two crested parents mate only three-fourths of the eggs hatch (the other  $\frac{1}{4}$  die as embryo's). Of the eggs which do hatch, two-thirds of the ducklings show crests and one-third do not have crests. How is the trait of crests in ducks inherited?

## **Dihybrid**

8. Widow's peak is dominant to normal hairline, and polydactyly (having more than 5 fingers) is dominant to the normal 5 fingered hand. Could a woman with a normal hairline and polydactyly and a man with a widow's peak and normal hands produce a child with normal hairline and normal hands? Explain.
9. Overheard at a Mabelle Company cocktail party: Could a brown eyed man with short eyelashes (whose mother had blue eyes) and a blue-eyed woman with long eyelashes (whose father had short eyelashes) have a child with blue eyes and short eyelashes? We know that brown eyes are dominant to blue and long lashes dominant to short. What do you think?