Name _____

Non-Mendelian Inheritance Practice Problems (10 points)
Work must be neatly done!! Be sure to make dominant and recessive alleles clearly distinguishable. (If I struggle to understand, there will be a deduction.)

Draw Punnett squares here

1. In plants known as "four o'clocks", the allele for the dominant red flower color is designated as 'F' and is incompletely dominant over the allele for white flowers 'f'. A horticulturist allows several heterozygous pink flowered four o'clocks to self pollinate and collects 200 seeds.

Draw a Punnett square for the cross and then identify the flower color phenotypes and theoretical percentage, and number of plants expected from these seeds.

Phenotypes % #

2. In mice yellow coat color is carried by the allele 'Z' is incompletely dominant over the 'z' allele. The heterozygote has brown fur. A research lab mates 10 heterozygous mice, and among the offspring, 42 have brown fur and 19 have yellow fur.

A. Draw a Punnett square for the cross.

B. Why does a 2:1 rather than a 1:2:1 ratio result from this cross?

3. Skin color in humans is determined by a polygenic inheritance system, possibly involving as many as 9 genes. For simplicity let's consider the influence of 3 genes: A, B, and C, where the dominant allele darkens skin color. Suppose a woman who is AABbCc mates with a man who is AaBbcc.

A. List all of the possible genotypes of the gametes that could be produced by **each** the parents:

B. Draw a Punnett square that shows the genotypes possible, and number each genotype from lightest (1) to darkest skin coloration.

C. In this cross, how many dominant alleles will children with the darkest skin coloration possess, and what theoretical fraction of the children will have this coloration?

# of alleles: ____ fraction: _____

4. In rabbits, white coat color (C^W) and black coat color (C^B) are codominant, and both of these alleles are dominant over albino (c); heterozygotes (C^WC^B) are spotted.

Draw a Punnett Square that shows the genotypes and phenotypes of the offspring from a heterozygous black-coated rabbit and a homozygous white-coated rabbit?

5. Mrs. Eryth is carrier of the sex-linked hemophilia allele, and Mr. Eryth is normal (as far as blood chemistry goes).

A. Draw a Punnett square that shows the theoretical genotypes and phenotypes among their children.

B. They actually have 4 male and 4 female children; how many of each sex would be expected to be hemophiliacs, carriers, and normal?

	# hemophiliac	#carrier	# normal
Male:	_____	_____	_____
Female:	_____	_____	_____

C. Is it more likely that Mrs. Eryth obtained the hemophilia allele from her mother or father? Why?

6. In humans, the alleles for blood type are designated I^A (A-type blood), I^B (B-type blood) and i (O-type blood). What are the expected frequencies of phenotypes in the following matings? Draw a Punnett square showing the results for a).

	%A	%B	%O	%AB
a) heter A x heter B :	____	____	____	____
b) I^AI^B x I^Ai :	____	____	____	____
c) I^AI^A x I^BI^B :	____	____	____	____
d) AB x O :	____	____	____	____

7. Blood type analysis is used frequently as evidence in paternity suits. Consider the following hypothetical cases presented in the table. The blood type of the mother and child are given; indicate which blood type(s), if any, of an accused man would exonerate him as the father.

Mother	Child	Exonerating blood type(s) (A, B, AB or O)
A	O	
B	AB	
O	O	
B	B	
A	B	