



Thomas Haney Secondary School

LG 14

Non-Mendelian Genetics

Worksheet

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Name _____

Non-Mendelian Inheritance Practice Problems

Work must be neatly done!! Be sure to make dominant and recessive alleles clearly distinguishable. Punnett squares should show genotypes and phenotypes. Make Punnett squares only as big as needed to show ratios.

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.

Phenotype % #

2. 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 ($C^W C^B$) 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?

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

A. Draw a Punnet 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?

	<u># hemophiliac</u>	<u>#carrier</u>	<u># normal</u>
%:	_____	_____	_____
#:	_____	_____	_____

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

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4. 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	%B	%O	%AB
a) heter A x heter B :	_____	_____	_____	_____

b) $I^A I^B$ x $I^A i$:	_____	_____	_____	_____
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c) $I^A I^A$ x $I^B I^B$:	_____	_____	_____	_____
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d) AB x O :	_____	_____	_____	_____
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5. 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	

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Blood Type Practice questions

Be sure to use proper designation of alleles (I^A , I^B or i) where called for

I. Identify the Characteristics of the Different Blood Groups

<u>Blood group</u>	<u>Type(s) of antigen on cells</u>
A	_____
B	_____
O	_____
AB	_____

Which blood groups are considered the "universal donor" and "universal recipient?"

Explain why these blood groups are so designated.

II. Identify the characteristics of the Alleles for Blood Type Determination

<u>Allele</u>	<u>Allele Expression (CoDom or Rec)</u>	<u>This allele creates which antigen on cell</u>
I^A	_____	_____
I^B	_____	_____
i	_____	_____

III. Identify the Genetics of Blood Type Determination

What are the possible genotypes?

<u>Blood type</u>	<u>of persons with this blood type</u>
A	_____
B	_____
AB	_____
O	_____