Name: _____ Period: _____ Date: _____ Seat: _____

Genetic Worksheet #5 Multiple Allele & Codominance – ABO blood typing

So far we have studied traits or genes that are coded for by just two alleles. Like in rabbits, there was one allele for brown hair color and one allele for white hair. However, some traits are coded for by more than two alleles. One of these is blood type in humans. This is a violation of Mendel's Principle of unit characteristics. In humans, there are four types of blood; type A, type B, type AB, and type O. The alleles A and B are co-dominant to each other and the O allele is recessive to both A and B alleles. So a person with the genotype AA or AO will have A type of blood.

a. What possible genotypes will produce B type of blood? _____

b. What is the only genotype that will produce O type of blood? _____

c. What is the only genotype that will produce AB type of blood?_____

1. You are blood type O and you marry a person with blood type AB.
a. Complete a Punnett square for this cross.

b. List the possible blood types (phenotypes) of your offspring. _____ ____

2. In the 1950's, a young woman sued film star/director Charlie Chaplin for parental support of her illegitimate child. Charlie Chaplin's blood type was already on record as type AB. The mother of the child had type A and her son had type O blood.
a. Complete a Punnett square for the possible cross of Charlie and the mother.

b. The judge ruled in favor of the mother and ordered Charlie Chaplin to pay child support costs of the child. Was the judge correct in his decision based on blood typing evidence? Explain why or why not. **refer to any Punnett squares to support your answer.*

3. Suppose a newborn baby was accidentally mixed up in the hospital. In an effort to determine the parents of the baby, the blood types of the baby and two sets of parents were determined. Baby 1 had type O; Mrs. Brown had type B Mr. Brown had type AB; and Mrs. Smith had type B Mr. Smith had type B.
a. Draw Punnett squares for each couple (you may need to do more than 1 square/ couple)

b. To which parents does baby #1 belong? Why? *Hint you may want to refer to your Punnett squares.*

Name: _____ Period: _____ Date: _____ Seat #: _____

Genetic Worksheet #4 - SEX LINKED TRAITS

As many of you know boys are different than girls. In humans sex is determine by the twenty third pair of chromosomes known as "sex chromosomes". If you have two x-shaped (XX) chromosomes you are destined to be a female. If you have an x and a Y-shaped (XY) chromosomes you are destined to be a male. Since the X and Y chromosomes carry different information, any genes found on the X chromosomes are referred to as sex-linked genes.

Therefore, women will have two alleles for these genes because they have two (XX)chromosomes. On the other hand, men have only one allele for each of these genes because they have only one X chromosome (XY). This is clearly a violation of Mendel's Principle of Unit Characteristics, which implies that you receive one set of alleles from each parent.

1. Hemophilia is a sex-linked trait. A person with hemophilia is lacking certain proteins that are necessary for normal blood clotting. Hemophilia is caused by a recessive allele so use "N" for normal and "n" for hemophilia. Since hemophilia is sex-linked, remember a woman will have two alleles (NN or Nn or nn) but a man will have only one allele (N or n). A woman who is heterozygous (a carrier) for hemophilia marries a normal man:

a. What are the genotypes of the parents? _____, _____
b. Make a Punnett square for the above cross.

c. What is the probability that a male offspring will have hemophilia? _____
d. What is the probability of having a hemophiliac female offspring? _____

2. Can a color blind female have a son that has normal vision? Color blindness is caused by a sex-linked recessive allele. **use N = normal vision and n = color blind*

3. Baldness is a sex-linked trait. What parental genotypes could produce a bald woman? **use H =normal hair, and h = bald*