Name _____   Date _____   Period _____
Biology – Ms. Strang

Unit 7: Genetics   WEEKEND HOMEWORK - Boo…

Genetics problems require practice…lots and lots of practice. To keep things fresh in your mind for Monday, **READ** the blurbs and **COMPLETE** the accompanying questions.

COMPLETE DOMINANCE (SIMPLE DOMINANCE)
The following problems involve traits that follow complete dominance rules, the rules first described by Mendel's Principle of Dominance that involve one letter (ex: R or r). On next week's test you will only be required to complete "monohybrid" Punnetts involving squares with 4 boxes inside.

1. Cross two heterozygous black-haired guinea pigs in the Punnett square below. Black hair color is the dominant allele and white is recessive. Show the possible genotypes and phenotypes of the offspring.

Genotypes:

Phenotypes:

a. What two forms of the trait for hair color are possible? _____
b. What was the phenotype for hair color of both parents? _____
c. What percentage of the offspring have the same phenotype as the parents? _____
d. What percentage of the possible offspring have the same genotype as the parents?
e. What is the genotype of the possible offspring that does not share the phenotype of the
        parents? _____

2. Cystic fibrosis (CF) is a disorder typically found in people of Northern European descent. The disorder is characterized by digestive problems and most notably mucus in the lungs that hampers breathing. The disorder results from mutated alleles of a gene on chromosome #7. The normal dominant allele is C. A parent can carry the disorder on a recessive allele (c) and potentially pass it along to their children.

a. What would the parents' genotypes have to be to pass the disorder along to their child?

b. What is the percent chance that their first child would have CF?

INCOMPLETE DOMINANCE
Mendel's Principle of Dominance did not always hold true for traits in species other than pea plants. In incomplete dominance, neither allele for a trait is dominant so the phenotype of the organism is an intermediate (blend) of the alleles. We use two different CAPITAL letters in these problems (ex: R and W).

3. In humans, straight-haired moms and straight-haired dads produce straight-haired babies. Curly-haired moms and curly-haired dads produce curly-haired babies. However, when a straight allele and a curly allele are combined, the baby has wavy hair. Show the results of a cross of two wavy-haired people. Complete the Punnett and show all possible genotypes and phenotypes for the offspring.

Genotypes:

Phenotypes:

CODOMINANCE
As in incomplete dominance, some traits do not have only 1 dominant allele. In codominance, both alleles for a trait are dominant and get expressed at the same time in the phenotype of the organism. You will not have to do Punnett squares for codominance, but you will have to provide a definition and examples.

4. Provide 2 examples of codominant traits:

SEX-LINKED TRAITS
Most of the human practice problems we've done involve genes on "regular" chromosomes. These are "complete dominance" problems like you did at the beginning of this homework. However, many genes occur on the 23rd pair of chromosomes which are called the sex chromosomes. The 23rd pair is either XX (female) or XY (male). There are plenty of genes on both the X and Y that code for female or male characteristics. However, there are also many other genes, some involving the possible expression of disorders, on these chromosomes. For these problems you need to use the XX or XY genotypes with superscripts, such as $X^H Y$.

5. Many people hold the misconception that colorblindness is the inability to see any color at all. They believe that these people see the world in black in white. However, this disorder simply means that the affected cannot tell the difference between certain colors (for example, red and green colors look the same), and they often live many years of their lives not knowing they are different from others. In the following Punnett square, cross a heterozygous mom who is not colorblind (but is a carrier) with a male who is not colorblind. Show phenotypes only.

Male phenotypes:

Female phenotypes: