Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_ Class Period: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Beyond Mendelian Genetics**

**Practice Problems**

**Science Skills**

1. Number the items below from smallest (1) to largest (6)

\_\_\_\_ DNA \_\_\_\_ Chromosome \_\_\_\_ Nucleotide \_\_\_\_ Nucleus \_\_\_\_ Cell \_\_\_\_ Atom

2. Match the karyotype description with the correct image.

a. Normal Female b. Down Syndrome Male c. Normal Male

\_\_\_\_  \_\_\_\_  \_\_\_\_ 

3. Match the pattern of inheritance with its description or example.

a. Polygenic b. Incomplete c. Multiple Allele d. Codominance

\_\_\_\_ More than two alleles exist for one gene.

\_\_\_\_ Two phenotypes appearing at the same time in heterozygous individuals.

\_\_\_\_ Many genes combine to produce one phenotype.

\_\_\_\_ Heterozygous individuals display a “blended” phenotype.

\_\_\_\_ Example: Human Blood Type (Type A, Type A, Type O)

\_\_\_\_ Example: Human Height

\_\_\_\_ Example: Human Hair Texture

\_\_\_\_ Example: Erminette (Speckled) Chickens

**Completion**

4. Sex-Linked traits are found on the \_\_\_\_ or \_\_\_\_\_ chromosomes. Females have two \_\_\_\_ chromosomes and males have one \_\_\_\_\_ and one \_\_\_\_\_\_ chromosome. Baldness is an example of a sex-linked, X-linked recessive disorder. Circle all individuals below that are colorblind.

XBXB  XBXb XbXb XBY XbY

Create a Punnett Square for a female carrier and a bald male.

Are any sons bald? \_\_\_\_\_\_\_ Where did they get their baldness from? \_\_\_\_\_\_\_

**Science Skills**

Examine the pedigree for albinism shown below, and then answer the questions that follow. You may need to use a Punnett square to answer some of these questions. (Albinism is a genetic condition in which an individual produces no pigment in his or her skin, hair, or eyes.)



Do you think albinism is a dominant trait or a recessive trait? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Explain your answer. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are the genotypes for individuals with albinism? \_\_\_\_\_\_\_ Carrier? \_\_\_\_\_\_\_ No albinism? \_\_\_\_\_\_\_\_

Write the genotypes for each individual in the pedigree above.

How many total males are represented on this pedigree? \_\_\_\_\_

How many total females? \_\_\_\_\_\_

How many individuals in Generation II had albinism? \_\_\_\_\_\_

How many individuals in Generation III were carriers of the trait? \_\_\_\_\_\_\_

If man 3 and female 4 of Generation III have another child, what is the chance that that child will have albinism?

Draw a pedigree for the Davis family. Mr. Davis does not have albinism and is not a carrier. Mrs. Davis is a carrier. They had two boys and one girl. All were carriers.

Use the pedigree below to answer the questions that follow. You may need to use a Punnett Square for some questions. Note: Half shaded carriers are not yet shown.



List the names of the people with the trait. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this a recessive or dominant trait? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain how you know. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this disorder sex-linked? \_\_\_\_\_\_\_ Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Possible Genotypes. Has the trait \_\_\_\_\_\_\_\_\_\_ Carrier for trait \_\_\_\_\_\_\_\_\_\_ No trait \_\_\_\_\_\_\_\_\_

Write any possible genotype for each individual on the pedigree above.

If Mike has the trait but his parents do not. What must be the genotype for Mike’s parents? \_\_\_\_\_\_\_

Half shade all known carriers.

If Jan married a man who was heterozygous for this trait, what is the probability that any one of their children would have the trait? \_\_\_\_\_\_\_\_\_\_\_\_

Draw a pedigree for the Belk family. Mrs. Belk has the trait and Mr. Belk is a carrier for the trait. They have two daughters and two sons. Both daughters are carriers, one son has the trait, and the other son is a carrier.

Interpreting Pedigrees: Read the description of the pedigree, underline name of the trait, underline if it is autosomal or sex-linked (this will determine genotypes), and write all possible genotypes beside each individual **BEFORE ANSWERING ANY QUESTIONS**!

*Earlobes*

 Morphology of human earlobes is an autosomal recessive trait.

****

1. How many children do individuals 1 and 2 have? \_\_\_\_\_\_\_\_\_ How many children do individuals 8 and 9 have? \_\_\_\_\_\_

2. How many sons do individuals 8 and 9 have? \_\_\_\_\_

3. What are the probable genotypes of individuals 8 and 9? \_\_\_\_\_\_\_ Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is the probably genotype of individual 14? \_\_\_\_\_\_ Phenotype? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What is the probable genotype of individual 2? \_\_\_\_\_\_ Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*Huntington’s Disease*

Huntington’s Disease is an autosomal dominant disease of the nervous system. All known genotypes are given.



1. Shade in all individuals that are known to have Huntington’s disease.

2. What is the most probable genotype for individual D who has the disease? \_\_\_\_\_\_\_

 Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. If individuals C and D have another child, what is the probability of this child having Huntington’s disease? \_\_\_\_\_\_\_\_

*Duchene Muscular Dystrophy*



1. How did female H inherit this disorder? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. How did male K get the disorder if his father did not have it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. If individuals C and D have another son, what is the chance that the son will have the disorder? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Next Up…Practice Quiz with Sickle Cell and Hemophilia Pedigrees. I know it’s not easy. Keep practicing!