Name _____
Date _____
Period ___

Lab Activity Report:
Mendelian Genetics - Genetic Disorders

Background: Sometimes genetic disorders are caused by mutations to normal genes. When the mutation has been in the population for a long enough amount of time, there is a greater chance that someone can be born with the disease. Geneticists can use information collected about family members or results of a genetic test to determine the likelihood that parents would have a child with a genetic disorder.

Purpose: In this activity, students will use Punnett Squares to determine the genotypes, phenotypes, and percentages of parents and children with certain traits. Students will learn about 2 genetic disorders determine which parents are more likely to have a child with the disease.

Biology Content Standards:
2g. *Students know* how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.

3a. *Students know* how to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive).

Pre-Lab Questions:
Use your textbook or other reference materials to find the following information.

1. What are the symptoms of Huntington's disease?
   _____
   _____
2. At what age is someone typically diagnosed to have Huntington's disease?
   _____
   _____
3. What is the prognosis for someone with this disorder? (How long will they live?)
   _____
   _____
4. What are the symptoms of cystic fibrosis?
   _____
   _____
5. At what age is someone typically diagnosed to have cystic fibrosis?
   _____
   _____
6. What is the prognosis for someone with this disorder?
   _____
   _____

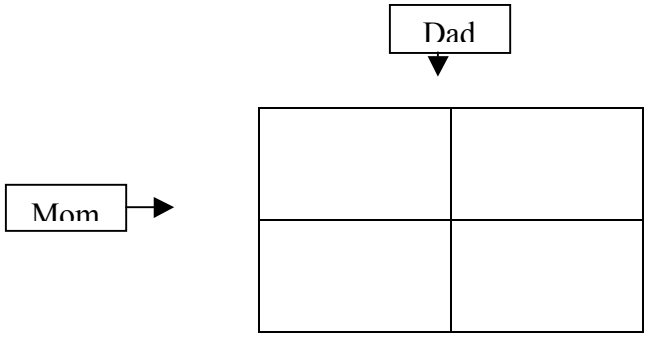
Procedure: (Dominant Genetic Disorder)

1. Huntington's disease is a genetic disorder that is caused by a defective DOMINANT gene. If a person has 1 or 2 dominant genes, they have the disorder. If a person has 2 recessive genes, they are normal.
2. What letters will be used for the genotypes of Huntington's disease?
    a. Huntington's: ____
    b. Normal: ____
3. What genotype does someone have if they are **homozygous** for **Huntington's disease**? ____
4. What genotype does someone have if they are **heterozygous** for **Huntington's disease**? ____
5. What genotype does someone have if they are **homozygous** normal? ____

Complete the following Punnett Squares:

6. A mother who is homozygous for Huntington's disease and a father who is homozygous normal want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____



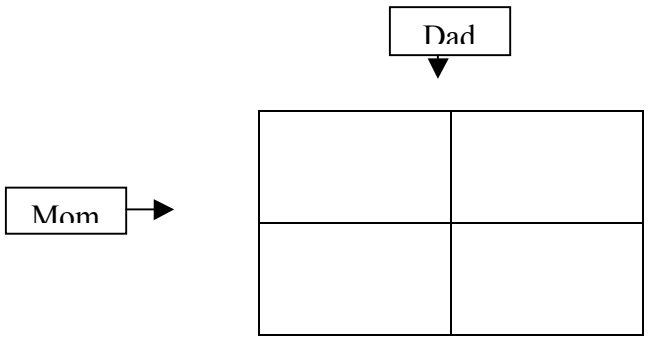
Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____

7. Suppose this woman immigrated from Europe to South America and had 12 children. What genotype do **all** of her children have? _____ (True story)

8. A mother who is heterozygous for Huntington's disease (child from mother in #8) and a father who is homozygous normal want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____

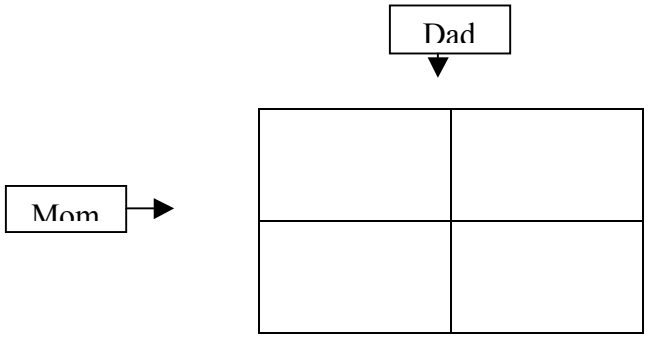


Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____
_____	_____	_____	_____

9. A mother who is heterozygous for Huntington's disease and a father who is heterozygous for Huntington's disease want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____



Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

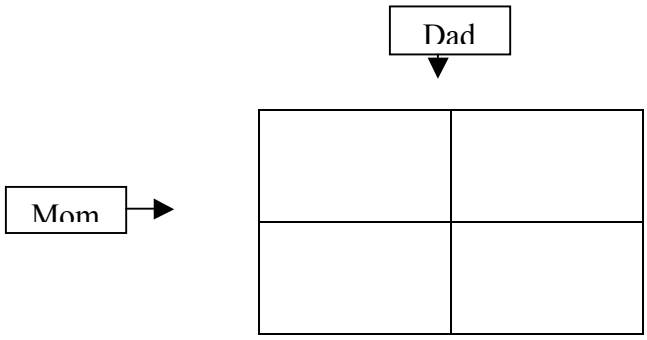
Procedure: (Recessive Genetic Disorder)

10. Cystic fibrosis is a genetic disorder that is caused by a defective RECESSIVE gene. If a person has 1 or 2 dominant genes, they are normal. If a person has 2 recessive genes, they have the disease.
11. What letters will be used for the genotypes of Cystic Fibrosis?
    a. Normal: ____
    b. Cystic Fibrosis: ____
12. What genotype does someone have if they are **homozygous** normal?____
13. What genotype does someone have if they are **heterozygous** normal? ____
14. What genotype does someone have if they are **homozygous** for Cystic Fibrosis? ____

Complete the following Punnett Squares:

15. A mother who is homozygous normal and a father who has Cystic Fibrosis want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____

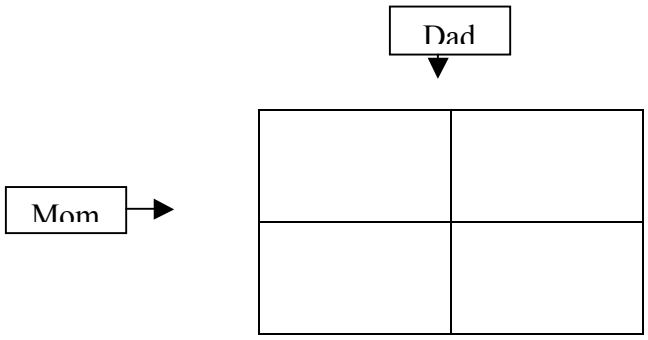


Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____

16. A mother who is heterozygous normal and a father who has Cystic Fibrosis want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____

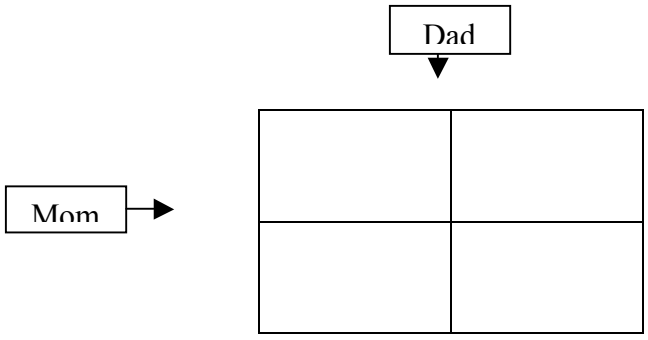


Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____
_____	_____	_____	_____

17. A mother who is heterozygous normal and a father who is heterozygous normal want to have a baby. What genotypes and phenotypes are possible for their child?

Mom ____ x Dad ____



Write all of the genotypes and phenotypes from the above Punnett Square in the space below.

Genotypes:	Phenotypes:	Fraction:	Percent:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Conclusions:

1. What is Huntington's disease?

   _____

   _____

2. How old is someone when they are diagnosed with Huntington's disease?

   _____

3. What genotypes can a person who has Huntington's disease have?

   _____

4. Why do you think that dominant genetic disorders are less common in the population. (Hint: think about the age that a person is when they start to show symptoms of Huntington's disease.)

   _____

   _____

5. What is Cystic Fibrosis?

   _____

   _____

6. How old is someone when they are diagnosed with Cystic Fibrosis?

   _____

7. What genotypes can a person who has Cystic Fibrosis have?

   _____

8. Why do you think someone who is heterozygous normal is often called a Carrier for a genetic disorder?

   _____

   _____

9. Is it possible for 2 carriers (both normal) to have a child with the disorder?

   _____