

Name: _____ Date: _____ Period: _____

Autosomal Dominance Worksheet

Autosomal dominance is another inheritance pattern we will learn. Until now, disorders such as cystic fibrosis, PKU, and sickle cell anemia have been recessive. However, there are examples where the disorder is DOMINANT and being healthy is recessive. This pattern is called autosomal dominance. Examples of these disorders include familial hypercholesterolemia (also called FH), Huntington's disease, and Neurofibromatosis. Because these disorders are dominant, a sufferer only needs to inherit 1 allele to become affected. This is different from disorders like cystic fibrosis, PKU, and sickle cell disease where you need to inherit two recessive alleles to become affected. People who suffer from this disorder are almost always heterozygous (Hh) because those who are born homozygous dominant (HH) will most likely die at an early age and thus not pass the disorder to future generations. This means that healthy individuals are homozygous recessive (hh).

BE SURE TO USE A PENCIL. NO PENS!

1. A 38 year old man (Hh) recently has been diagnosed with familial hypercholesterolemia which is a dominant disorder. Prior to his diagnosis, he and his wife had 3 children, a boy first and then two girls. The wife was recently tested negative for familial hypercholesterolemia (hh). Draw a pedigree that includes this family of five. Include a Punnett square of the parents.

Draw your Punnett square below

Draw your pedigree of the 5 people below



- a. Write in the genotype next to or inside of each circle and square in your pedigree above.
- b. What is the probability that each child will become affected by FH?
0% 25% 50% 75% 100%

2. Jason is a 12 year old boy with no history of familial hypercholesterolemia in his family and has dreams of marrying his 10 year old neighbor Michelle when they become older. Michelle's mother and father are both affected by familial hypercholesterolemia, but she has been tested and she does not contain the familial hypercholesterolemia gene. Jason has just learned about genetics in school and wants to predict the health of their future children. He has always wanted 2 children. Draw a pedigree that includes every person mentioned in the story. Include a Punnett square of the Jason and Michelle.

BE SURE TO USE A PENCIL. NO PENS!

Draw your Punnett square below

Draw your pedigree of the 6 people below



- a. Write in the probable genotype next to or inside of each circle and square in your pedigree above.
- b. What is the probability that each child will become affected by familial hypercholesterolemia?
0% 25% 50% 75% 100%

3. OK...this one is long. You will need to get creative because this man had children with 3 different wives over the course of his life. Woody Guthrie was a famous folk singer who died in 1967 due to complications from Huntington's disease. He is perhaps best known for his song "This Land Is Your Land", which is regularly sung in American schools. He was selected to the Rock and Roll Hall of Fame in 1988.

Let's start with Woody's parents, Charles and Nora. Together, they had 4 children: Clara, Woody (1912), Mary Jo, and Roy. Later, Nora was institutionalized in a mental hospital where she eventually died. It was revealed decades after her death that she died due to Huntington's disease, which is a dominant disorder. Charles' family has no history of HD.

In 1933, Woody married his first wife Mary and they had 3 children between them: Gwen, Sue and Bill. Due to constant travels around the country playing his music, stress between Woody and Mary led to a divorce in 1943. Years later, Gwen and Sue were diagnosed with Huntington's disease. Both died at 41 years of age. Mary's family has no history of HD.

In 1945, Woody married his 2nd wife Marjorie and over the years had four children: Cathy, (who died at age four in a tragic home fire), Arlo (who would become a famous folk singer himself), Joady, and Nora Lee. By the late 1940s, Woody's health was worsening and his behavior became extremely erratic. In 1952, Woody was finally diagnosed with Huntington's disease, the genetic disorder inherited from his mother. Believing him to be a danger to their children, Marjorie suggested he return to California without her and they eventually divorced. Marjorie's family has no history of HD.

As Woody's health worsened he met and married his third wife, Anneke, and they had a child, Lorina Lynn. In 1954, Anneke filed for divorce due to the strain of caring for Woody. Anneke's family has no history of HD.

After his 3rd divorce, Woody's second wife Marjorie reentered his life. Marjorie cared for him and assisted him until his death. Woody's illness was essentially untreated due to a lack of information about Huntington's disease at the time. However, his death helped raise awareness of the disease and led Marjorie to help found the Huntington's Disease Society of America.

BE SURE TO USE A PENCIL. NO PENS!

- a. Create a pedigree that shows every person (yes...you will need to read the entire story) described above.
- b. Next to each circle or square, write the genotype of every person. There are **17 people** in this story

Below, create a Punnett square for each of Woody's three wives. What are the chances that his children will have Huntington's disease?

Wife 1 (Mary)

Wife 2 (Marjorie)

Wife 3 (Anneke)