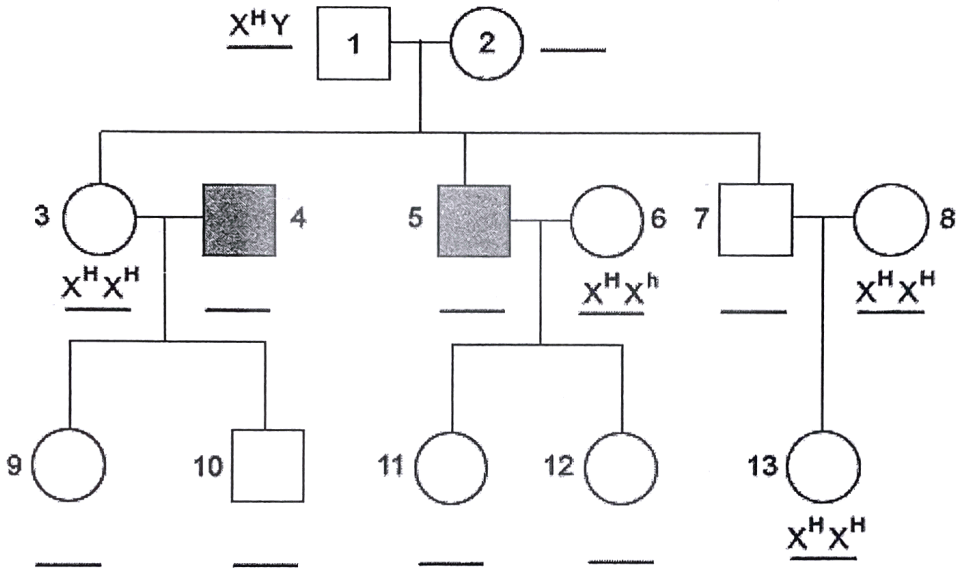
Name: _____ Row: _____

Date: _____ Period: _____

Sex-Linked Pedigrees Worksheet

Background Information. Pedigrees are used to trace a gene as it is passed down from generation to generation. The squares represent a male and the circles represent a female. In the examples in this handout, the shaded circles and squares will represent having the disorder. Make sure to read each question to find out if a disorder is caused by dominant alleles or recessive alleles. A person can be a carrier of a trait, meaning they have heterozygous alleles.

1) Hemophilia is a recessive sex-linked disorder located on the X chromosome where a person's body can not control blood clotting or coagulation. Write in the genotypes on the line next to / below each individual.



For all phenotype questions, *on the first line write:* ***male or female*** *and the second line write:* ***normal, carrier, hemophilia.***

2) What is the phenotype of individual 2? _____ _____

3) What is the phenotype of individual 4? _____ _____

4) What is the phenotype of individual 5? _____ _____

5) What is the phenotype of individual 7? _____ _____

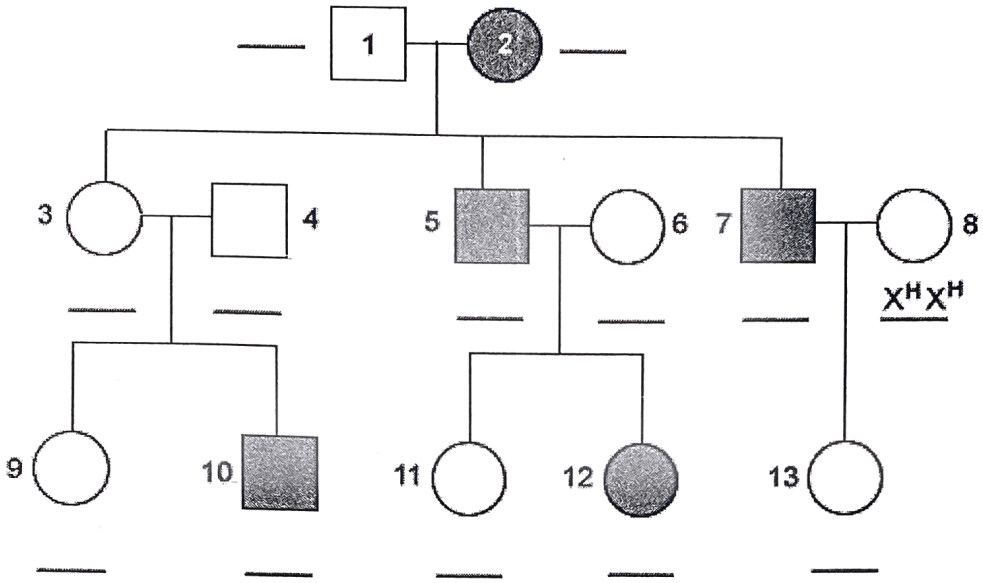
6) What is the phenotype of individual 9? _____ _____

7) What is the phenotype of individual 10? _____ _____

8) What is the phenotype of individual 11? _____ _____

9) What is the phenotype of individual 12? _____ _____

10) Fragile-X syndrome is a recessive sex-linked disorder located on the X chromosome. Below is a pedigree tracing the passing of the fragile-X syndrome gene through 3 generations. Write in the genotypes on the line next to / below each individual.



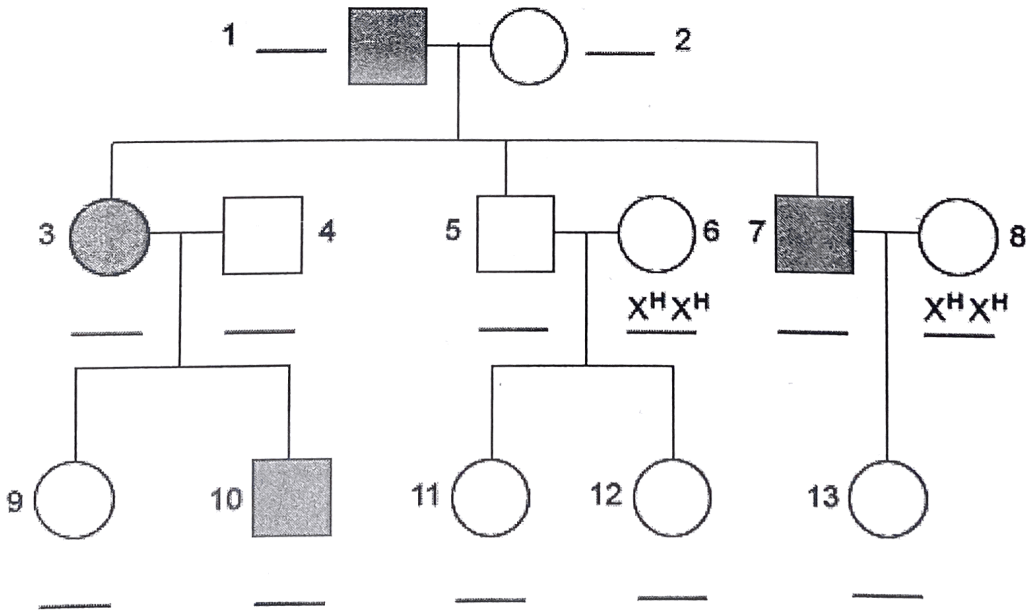
For all phenotype questions, *on the first line write:* ***male or female*** *and the second line write:* ***normal, carrier, fragile-X.***

11) What is the phenotype of individual 1? _____ _____

12) What is the phenotype of individual 4? _____ _____

13) What is the phenotype of individual 6? _____ _____

14) Below is a recessive sex-linked pedigree tracing the red-green colorblindness gene located on the X chromosome. Write in the genotypes on the line next to / below each individual.



CASE STUDY

Pedigrees

Directions: Use the information in the individual case studies to create a pedigree for each case study on a separate sheet of paper. Then answer the questions that go with each case study.

1. **Case Study #1**
   a. **Robert has a widow's peak.**
   b. **Robert's father and paternal grandfather also have widow's peaks.**
   c. **Robert's mother and paternal grandmother do not have widow's peaks.**
   d. **Robert's maternal grandparents also do not have widow's peaks.**

Case Study #1 Questions

1. Construct a Punnett Square for Robert's parents.
2. What is Robert's genotype?
3. What is the probability that Robert's siblings ***will not*** have a widow's peak?
4. Is it possible for Robert's maternal aunt, Rachel, to have a widow's peak?
5. For which member of the family do we not know their exact genotype?

2. **Case Study #2**
   a. **Silas has been living with sickle cell anemia all his life.**
   b. **Silas' wife Keisha had genetic testing & does not carry the gene.**
   c. **Silas' parents are both healthy although his maternal grandmother also had sickle cell.**
   d. **Keisha's parents are both healthy.**
   e. **Keisha's identical twin brothers, Sam & Dave, both have sickle cell anemia.**

Case Study #2 Questions

1. Construct a Punnett Square Silas' parents.
2. What is Silas' father's genotype?
3. What is Keisha's genotype?
4. What are Keisha's parents' genotypes?
5. What is the probability that Keisha and Silas will pass sickle cell onto their children?

3. **Case Study #3**
   a. **Tim and Tom are twins.**
   b. **Tim can roll his tongue but Tom, like his dad, cannot.**
   c. **Both of their paternal grandparents can roll their tongue.**
   d. **Their maternal uncle cannot roll his tongue like his father.**

Case Study #3 Questions

1. Construct a Punnett Square for Tim & Tom's parents.
2. What is Tim & Tom's mom's genotype?
3. What are the genotypes of Tom's paternal grandparents?
4. What is the probability that Sara, Tom & Tim's newborn little sister will be able to roll her tongue?
5. What type of twins are Tim & Tom, fraternal or identical? Explain.

Class Set – Do NOT write on this sheet

4. Case Study #4
    a. **Shane & Lauren have 3 children; Ron, Amy, and Jean.**
    b. **Shane has male patterned baldness unlike his father and father in-law who both have a full head of hair.**
    c. **Both his mother & mother in-law's hair is beginning to thin.**
    d. **Lauren has a full head of thick hair with no signs of thinning unlike her brother who is going bald.**

Case Study #4 Questions

1. Construct a Punnett Square for Shane & Lauren's family.
2. What is Lauren's genotype?
3. What are the genotypes for the children?
4. What family members are carriers?
5. What is the probability that Shane & Lauren will have son with male patterned baldness?

5. Case Study #5
    a. **Rachel has been recently diagnosed with Huntington's disease, a degenerative brain disorder caused by a dominant gene.**
    b. **Mark and Karen are Rachel's parents and have 2 other children, Sam and Dave, who do not carry the gene.**
    c. **Mark's family has no history of Huntington's disease and he does not carry the gene.**
    d. **Karen's father and his family do not carry the gene, however Karen's mother died from complications from the disease.**
    e. **Both of Karen's maternal grandparents were carriers of the gene.**

Case Study #5 Questions

1. Construct a Punnett Square for Mark & Karen.
2. What is Karen's genotype?
3. What is the genotype of Karen's father?
4. What is the probability that Karen & Mark will have another child who carries the Huntington gene?
5. Is Huntington's disease a sex-linked trait? Explain.