### Pedigree Analysis

**Name __________________________________**

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1. How many **children** did individuals I-1 and I-2 have? ___6___ How many HAVE Huntington’s Disease? ___3___

2. How many **daughters** did II-1 and II-2 have? ___2____ How many **sons**? _____1____

3. How are individuals III-2 and II-4 related? __Uncle/Niece__ I-2 and III-5? __Grandmother/Grandson____

4. **There are no carriers for Huntington’s Disease**- you either have it or you don’t.
   With this in mind, is Huntington’s disease caused by a dominant or recessive trait? _____Dominant_____

5. Write the **genotypes** over all known individuals. Represent unknowns with question marks.

6. The pedigree to the right shows a family’s pedigree for **Hitchhiker’s Thumb**. Is this trait dominant or recessive? __recessive________

7. **How do you know?** __If it was dominant, either Parent III-1 or III-2 would have the trait_____

8. Therefore, write the **genotypes** of above the individuals with Hitchiker’s Thumbs (use T / t).

9. How are individuals III-1 and III-2 related? __cousins AND married_________

10. Write the **genotypes** above individuals III-1 and III-2.

11. Is it possible for individual IV-2 to be a carrier? __yes__ Why or why not? ___parents are heterozygous_________

12. The pedigree to the right shows a family’s pedigree for colorblindness. Which sex can be **carriers** of colorblindness and not have it? _____females________

13. With this in mind, what kind of trait is colorblindness (use your notes)? **Sex linked and recessive**

14. Write the **genotypes** above all individuals.

15. Why do all **daughters** in generation II carry the colorblind gene? __they received a colorblind allele from dad__

16. If individual IV-7 had children, what percentage of her **sons** would you expect to be colorblind? __100%____
17. In the world of Harry Potter, having magical abilities is a completely recessive trait (muggles are individuals which express the dominant non-magical trait). Draw a pedigree that traces magical abilities through three generations of Harry Potter’s family. Harry is a wizard. His father James was a wizard and his mother Lily was a witch. Both of James’s parents had magical abilities; however, Lily’s parents and her sister Petunia were all muggles. Harry’s Aunt Petunia married Vernon Dursley and had a son, Dudley. The Dursleys are all non-magical muggles (and proud of it!). Shade the circles/squares of all magical individuals. Write the names of each individual as well as their genotypes underneath each circle/square. If an allele is unknown, use a question mark.

a) Would it have been possible for Vernon and Petunia Dursley to have a magical child? Why or why not?
   It would be possible if both Vernon and Petunia are heterozygous, but it is unknown whether they are homozygous or heterozygous.

b) Harry married Ginny Weasley. What would be the expected genotypes and phenotypes of their children?
   Both Ginny and Harry are magical, which is a recessive trait. This means ALL of their children would have the magical recessive trait.
18. Oompa Loompas can have red, blue or purple hair. Use colored pencils to shade in the circles/squares of the individuals in Otis Oompas family in order to illustrate their hair colors. Otis Oompa has blue hair and marries Ona Oompa who has red hair. They have 2 children, a boy (Oscar) and a girl (Olivia). Their daughter Olivia married Orville, who has purple hair. Orville and Olivia have 4 children. One of their daughters has red hair while the other daughter has blue hair. Both of their sons have purple hair. Oscar married Opal who has red hair. Oscar and Opal had 6 sons, 3 with red hair and 3 with purple hair. Write the genotypes under every Oompa.

a) In Oompa Loompas, hair color is an example of which complex inheritance pattern?
Incomplete dominance because purple is a blend of red and blue.

b) Would it have been possible for Oscar and Opal to have children with blue hair? Why or why not?
No – because Oscar has the genotype RB and Opal has the genotype RR.

c) Olivia and Orville’s daughter with blue hair, Ophelia, wants to have children with red hair. What color hair should she look for in a spouse?
It isn’t possible for Ophelia to have children with red hair 😞
19. **Achondroplasia is a common form of hereditary dwarfism that causes very short limbs, stubby hands and an enlarged forehead.** Draw the pedigree that traces this disorder in the Roloff family. Matt and Amy Roloff both have achondroplasia dwarfism. Of their four children, three are of normal height (Jacob, Molly and Jeremy) and one has achondroplasia (Zachary). Shade the circles/squares of the individuals with dwarfism.

   a) Achondroplasia is an example of which type of inherited trait? How do you know?
   
   **Dominant. If it was a recessive trait, all of Matt and Amy’s children would have achondroplasia.**

   b) Both Matt’s parents and Amy’s parents are of average height. What does this mean about how they must have inherited dwarfism?
   
   **It must have been a mutation.**
20. **Hemophilia is a recessive, sex-linked disorder which causes an inability to clot when bleeding.** Ray and Elaine Smith were married in 1970. Neither Ray nor Elaine had hemophilia. They had two daughters and then a son. Both daughters, Alicia and Candace, had normal clotting abilities and never had any children of their own. The son, Mike, had hemophilia and married Beth, who did not. They had two children of their own, first Gregory and then Victoria. Surprisingly, Victoria had hemophilia but Gregory did not. **Draw the pedigree that traces hemophilia in the Smith family, shade in the circles/squares of the individuals with the blood disorder.**

   a.) Why is it surprising that Victoria had hemophilia but Gregory did not? **Because it is more common for males to have sex linked disorders than female. Victoria had to receive two recessive alleles in order to have hemophilia. Gregory would have had to have only received one in order to have the disorder.**

   b.) If Victoria has children, what do you automatically know about her…

   Daughters? **They will at least be carriers of hemophilia.**

   Sons? **All of her sons will have hemophilia.**