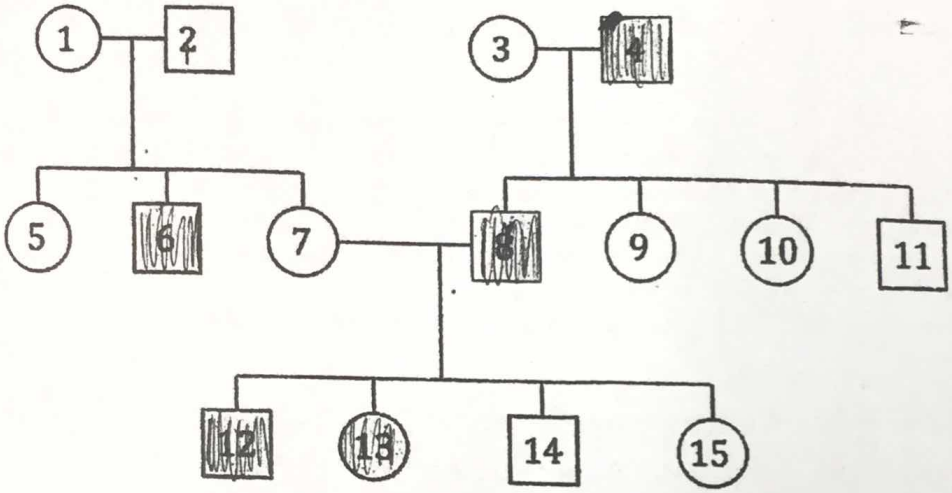
Name _____

Genetics Practice Problems: Pedigree Tables #3

Remember the following when working pedigree tables:
1) Circles are females and squares are males.
2) A shaded circle or square indicates that a person has the trait.
Hint Colorblindness is a sex Linked trait.
The pedigree seen below is for colorblindness. Shaded individuals are colorblind. First, determine the probable genotype of persons 1 – 15; then, answer the questions below the table.



How did you determine the genotype of the mother at 3?

Number 8 was colorblind just like his father. Where did the son at 8 get his allele for colorblindness?

Neither numbers 1 nor 2 were colorblind. How did they have a colorblind son (6)?

What must be the genotypes of the parents of a colorblind daughter? Explain.

If number 13 marries a normal man, what is the probability that their sons will be colorblind?

PEDIGREE PRACTICE

On a separate sheet of paper, draw the pedigrees using the given information and then answer the questions that follow.

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?

b) Harry married Ginny Weasley. What would be the expected genotypes and phenotypes of their children?

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?

b) Would it have been possible for Oscar and Opal to have children with blue hair? Why or why not?

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?

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?

b) Both Matt's parents and Amy's parents are of average height. What does this mean about how they must have inherited dwarfism?

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?

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

Daughters?

Sons?