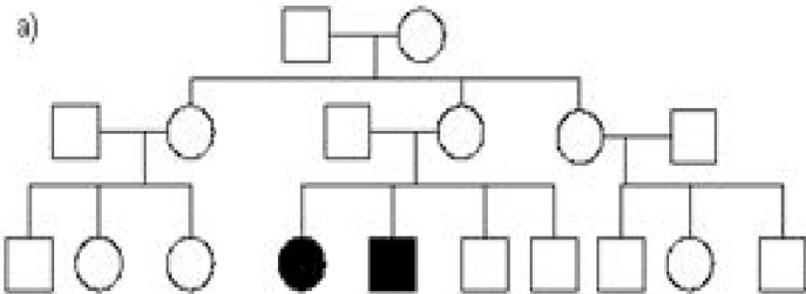


HUMAN Pedigree ANALYSIS PROBLEM SHEET

Background: **Autosomes** are chromosomes 1-22 (for humans, non sex). **Sex chromosomes** represent the 23rd pair of chromosomes (in humans). There are a number of different types of human pedigrees that you may encounter, however, there are only a few different modes of inheritance that you will need to be familiar. The following pedigrees show you different examples of human traits that can be traced through generations. See if you can identify the modes of inheritance, and answer any questions directly related to each pedigree. While you are working on this, keep the following clues in mind:

Clues for Autosomal Inheritance	
Recessive <ul style="list-style-type: none"> Individual expressing trait has 2 normal parents Two affected parents cannot have an unaffected child 	Dominant <ul style="list-style-type: none"> Every affected person has at least one affected parent Each generation will have affected individuals.
Clues for Sex-linked Inheritance	
Recessive <ul style="list-style-type: none"> No father-to-son transmission Predominantly males affected Trait may skip generations 	Dominant <ul style="list-style-type: none"> Not Applicable

1) For each of the pedigrees below (a-d), identify the mode of inheritance and provide at least a piece of evidence for your choice.

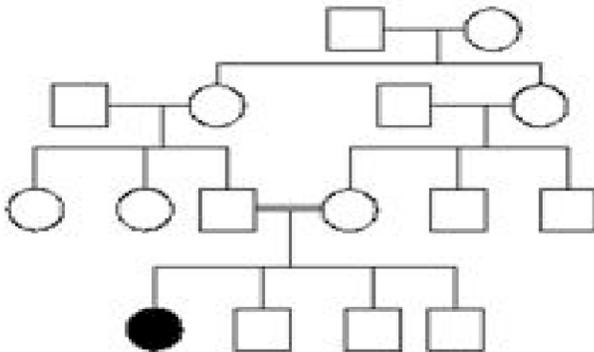


Mode of Inheritance: _____

Evidence:

-

b)

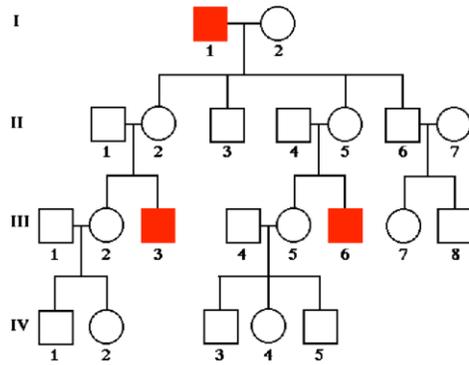


Mode of Inheritance: _____

Evidence:

-

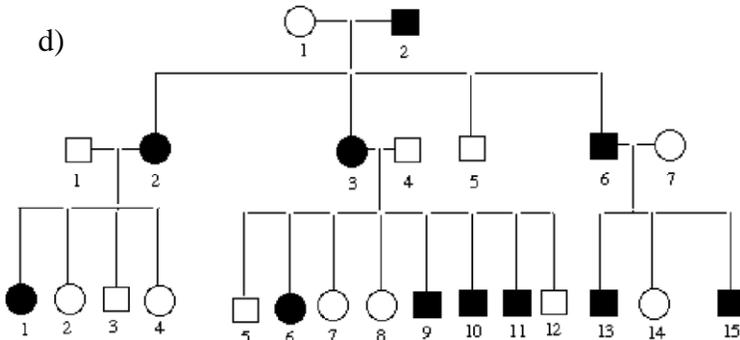
c)



Mode of Inheritance: _____

Evidence:
-

d)

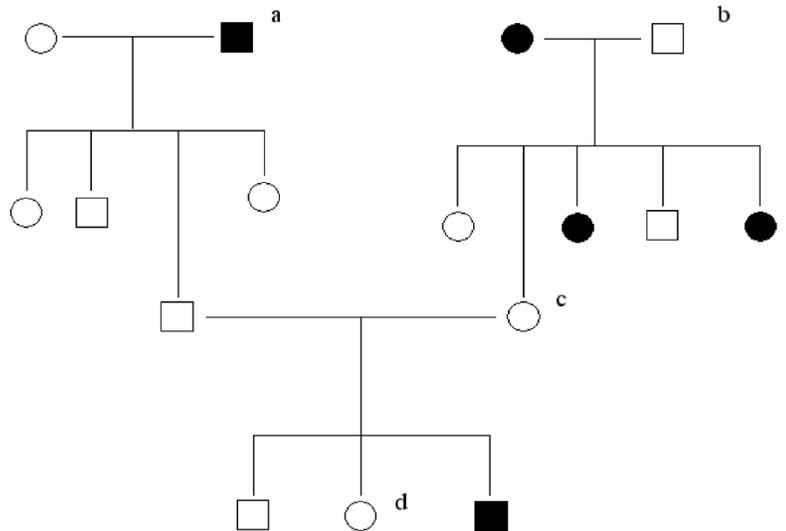


Mode of Inheritance: _____

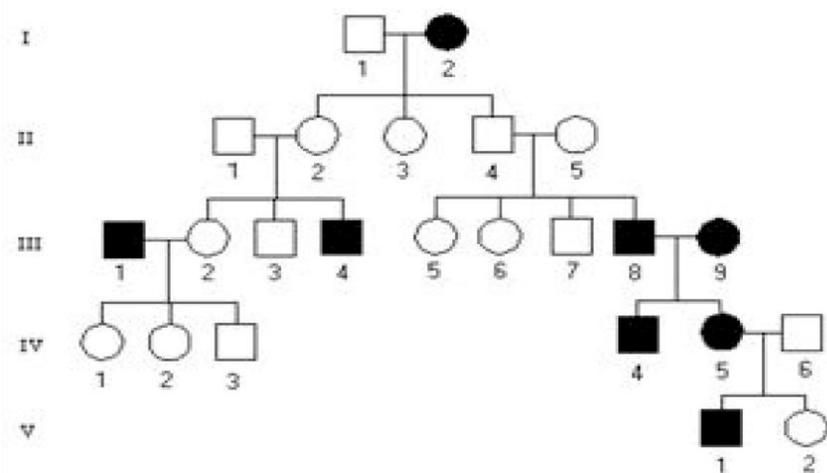
Evidence:
-

2) This is a pedigree for an inherited lung disease. Provide the genotypes of each of the individuals marked with lower case letters. For example, a carrier may be shown as (Tt).

- a =
- b =
- c =
- d =



3) Use the Pedigree for Trait A to determine the genetic basis of this trait.



a) Does a dominant or recessive allele produce the trait? Explain.

b) Is it autosomal or sex-linked? Explain.

c) What are the genotypes of all the individuals in the pedigree? (Write them on the pedigree.)

d) What is the genotype of individual IV-2? Explain.

e) What is the genotype of individual IV-6? Explain.

f) What is the genotype of individual I-1? Explain.

4) Use the information provided below to **create a pedigree**. Then **answer the question** at the end of each description.

a) The ability to roll your tongue is dominant to not being able to roll your tongue. Draw a pedigree to show the inheritance of this trait, given the following family history: Grandpa Joe is a tongue roller but Grandma Joe is not. They have four children (2 sons and 2 daughters) who are all rollers. Their last daughter, Anna, married John William. John's parents are both rollers, but John's two sisters are non-rollers. John is a roller. John and Anna have three children named Penelope (a non-roller), Hannah (a roller) and Jake (a roller). What was the chance that Penelope was a non-tongue roller?

b) Manny and Sally have children. They have three children, 1 girl (Georgia) and 2 boys (Pete and Alex). Sally is a carrier of hemophilia, an X-linked disorder. She passes the gene on to one of the boys who died in childhood (Pete) and the daughter Georgia is a carrier. Georgia marries a Matt who has hemophilia and have 3 children (2 boys and a girl). What is the percent chance that Georgia and Matt's children will have hemophilia?

c) Trey and Martha were married and had children. Trey was color blind, an X-linked disorder. They had eight children:



Doug, Johnny, Drake



Hope, Lucy, Alice, Lilian, Annie

Doug is also color-blind. Doug married Judy and had three children, 2 boys and 1 girl. Judy is a carrier for color-blindness. What are the chances of their children being colorblind? Also, how is it that Doug is colorblind?

The great-great maternal grandmother of a boy was a carrier for color blindness, an X-linked disorder. His great uncle on his mother's side was color blind but his great uncle's father was unaffected. The boy's mother has 2 brothers (1 color blind, 1 unaffected) and 1 sister (unaffected). The boy's grandmother on his mother's side had 1 brother who was color blind and 3 sisters. Two of these sisters were unaffected and one was a carrier. The boy's great grandmother on his mother's side had 4 sisters. The boy has one unaffected sister and he is color blind. What is the probability of the boy's sons being color blind if he marries a non-carrier?