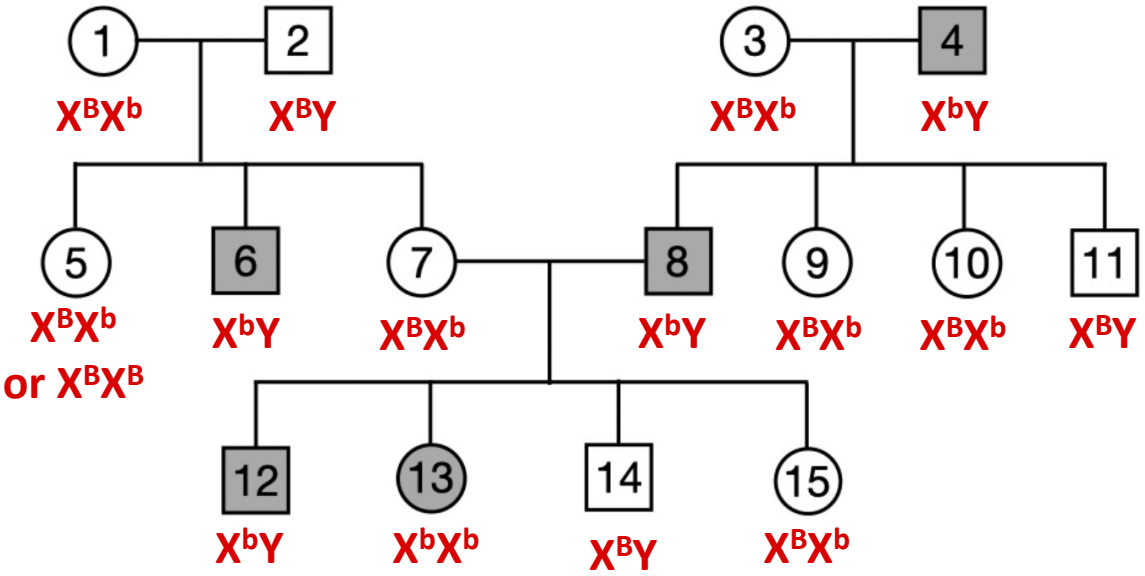
Name:	Date:

Genetics Practice Problems: Pedigree Tables

Remember the following when working pedigree tables:

- Circles are females and squares are males.
- A shaded circle or square indicates that a person has the trait.

The pedigree seen below is for colorblindness. Shaded individuals are colorblind. The allele for colorblindness is carried on the X chromosome and is recessive. Determine the probable genotype of persons 1 – 15, and then answer the questions below the table.



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

The mother (3) had a colorblind son (8). He had to receive his colorblind allele from his mother. Since the mother is not shaded, she must be a carrier.

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

The son (8) received his allele for colorblindness from his mother. Males receive their Y chromosomes from their fathers.

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

The mother was a carrier for colorblindness.

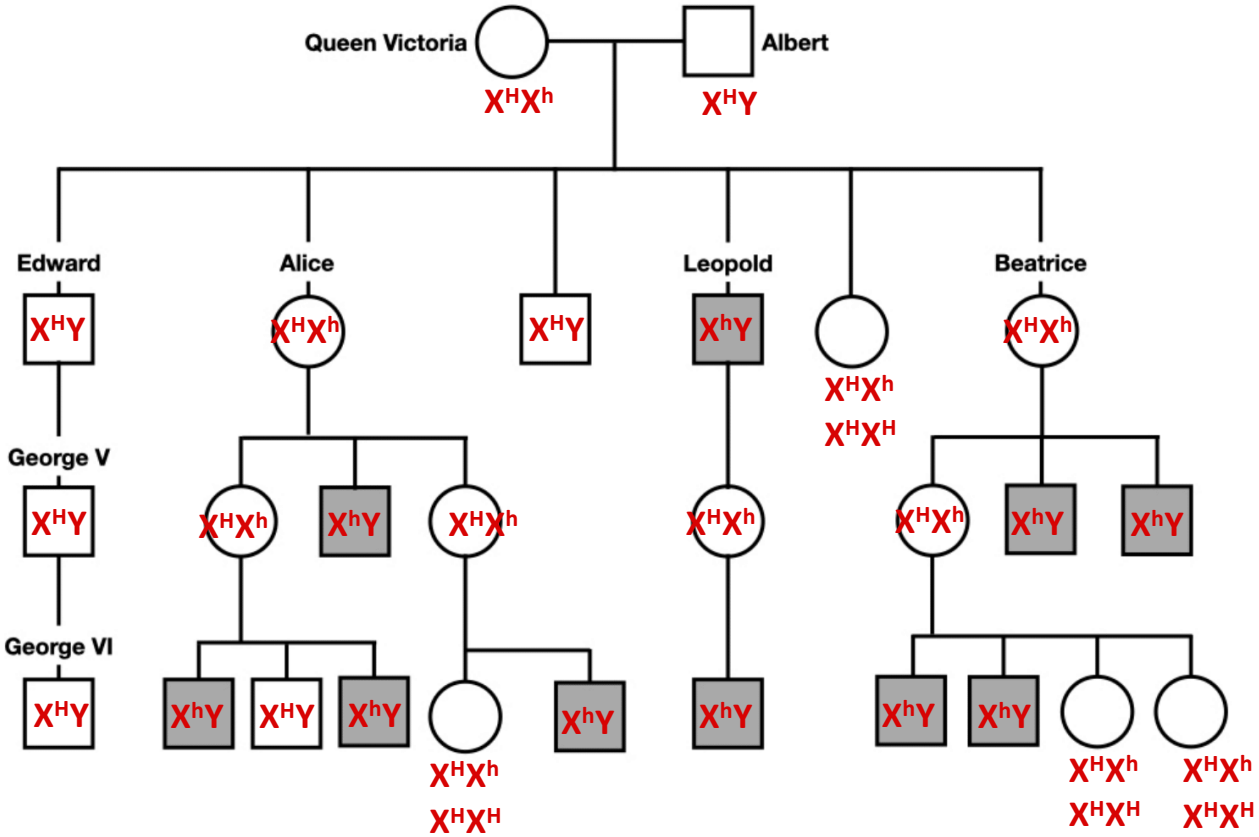
What must be the genotypes of the parents of a colorblind daughter? Explain.

To have a colorblind daughter, she would have to inherit the colorblind allele from each parent. Her father must be X^bY and the mother would have to be X^BX^b or X^bX^b.

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

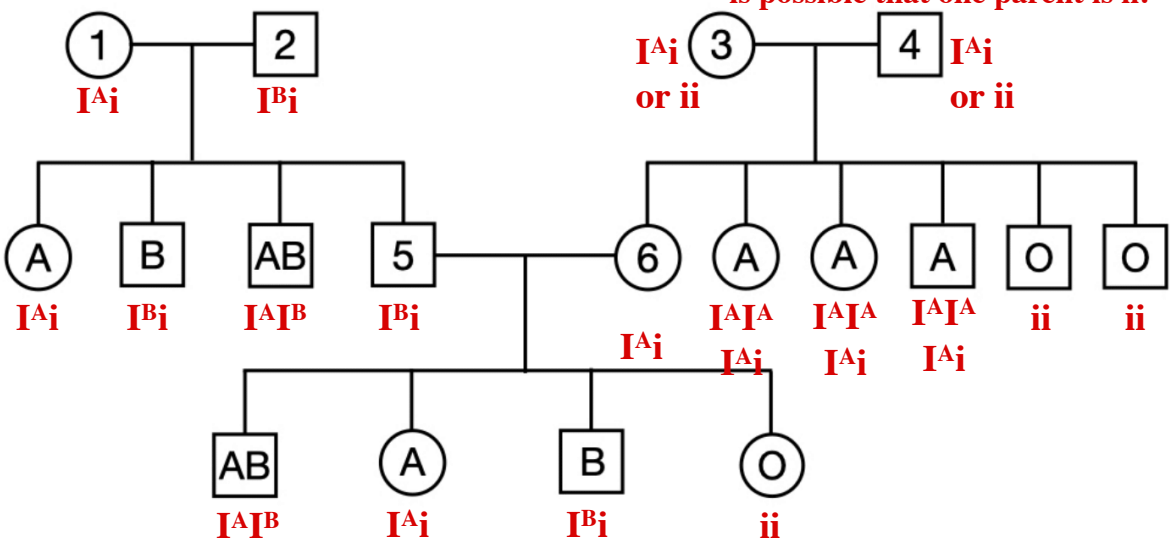
X^bX^b (13) x X^BY (normal man) → All of their sons would be colorblind.

Queen Victoria was the world's most famous carrier of hemophilia. Her son, Leopold, and two carrier daughters, Alice and Beatrice, spread the allele fairly widely through the royal families of Europe, Prussia and Russia. Fortunately, no modern monarchs have inherited the allele. Indicate the probable genotype of each of the people below. Remember, hemophilia is a sex-linked recessive trait. Shaded individuals have the disease.



The pedigree table below shows the blood types of three generations of family members. Notice that some of the blood type **phenotypes** have been given to you. What is the genotype of individuals 1 – 6? Give the probable genotype of all other family members.

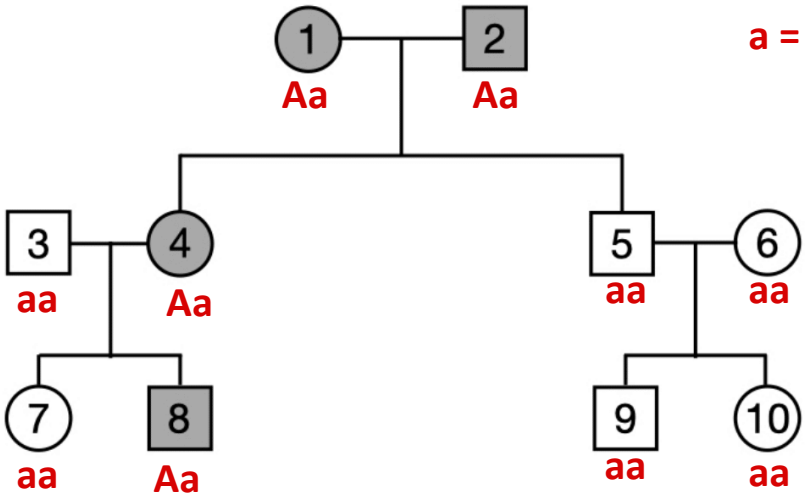
One of these parents has to be I^Ai. It is possible that one parent is ii.



Students may find this problem frustrating. I like this problem because it forces the student to think about many different possibilities.

The trait represented by the colored circles and squares below is inherited as a dominant allele. This is not a sex-linked trait. Shaded individuals show the dominant trait. What is the probable genotype of each individual?

A = dominant trait
a = recessive trait



Are there any homozygous dominant individuals in the pedigree above? How do you know?

No. There is no possibility that any individual could inherit the dominant allele from each parent and still produce offspring that are recessive.

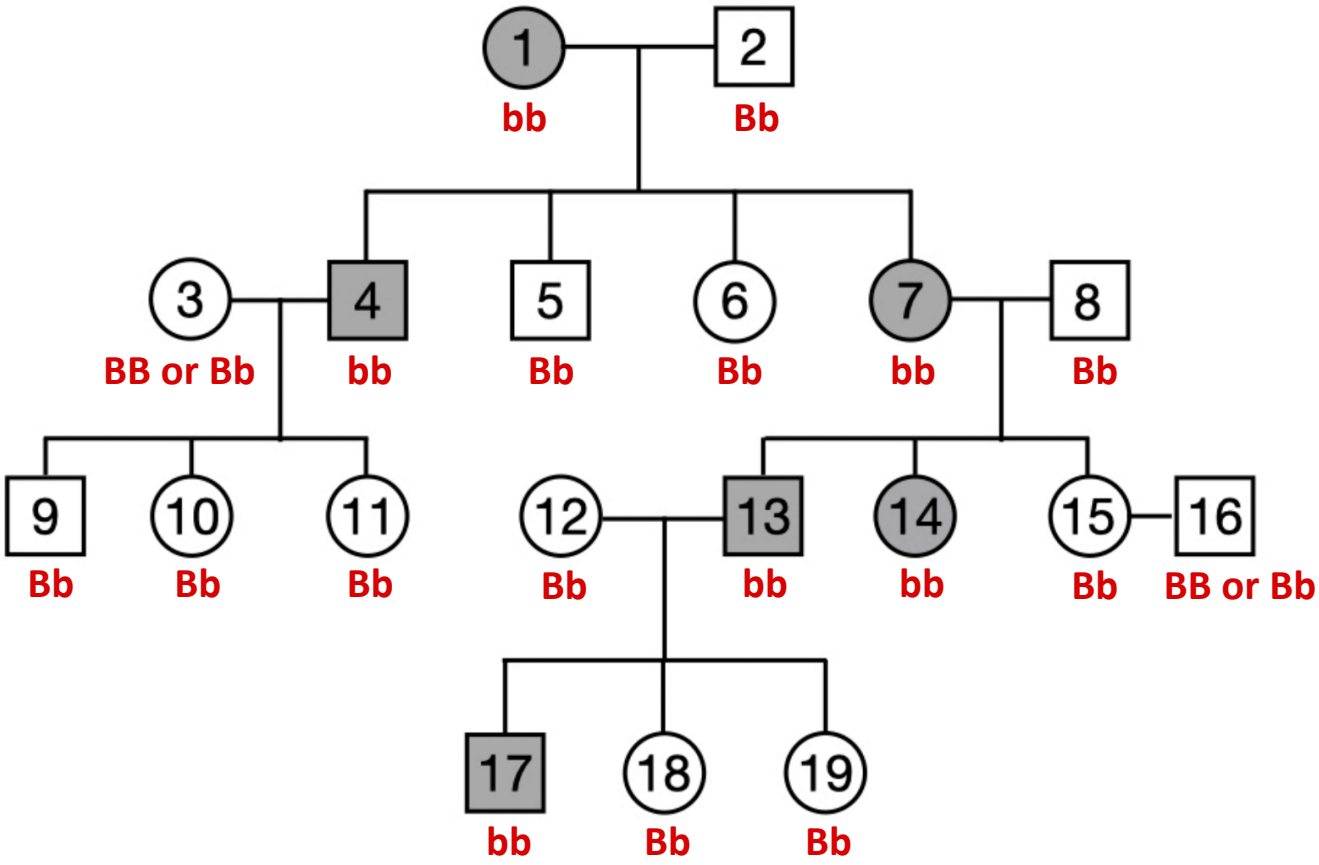
What is the probability of the trait appearing in offspring if 7 should marry 9?

aa (7) x aa (9) There is no possibility of the dominant trait appearing in their offspring.

What is the probability of the trait appearing in offspring if 8 should marry 10?

Aa (8) x aa (10) There is a 50% chance of the trait appearing in their offspring.

This pedigree table shows the eye color in four generations of a family. Brown eyes are dominant over blue eyes. Eye color is not sex-linked. It is inherited as dominant or recessive alleles on one of the autosomes. Shaded individuals have blue eyes. Determine the probable genotype of each individual below.



When 1 and 2 married and had children, what genotypes, phenotypes, and probabilities should have been expected in the offspring? Did these expected probabilities agree with what actually occurred in their 4 children?

bb (1) x Bb (2) You expect that ½ of offspring will be Bb and ½ of offspring will be bb. This exactly agrees with the actual offspring.

When 3 and 4 married and had children, what genotypes, phenotypes, and probabilities should have been expected in the offspring? Did these expected probabilities agree with what actually occurred in their 3 children?

If 3 is BB, you would expect all three children to have brown eyes, and they did.

If 3 is Bb, you expect ½ of offspring to be Bb and ½ of offspring to be bb. None of the children are bb, but a sample size of 3 children is not large enough to be 100% sure of the genotype of parent 3.