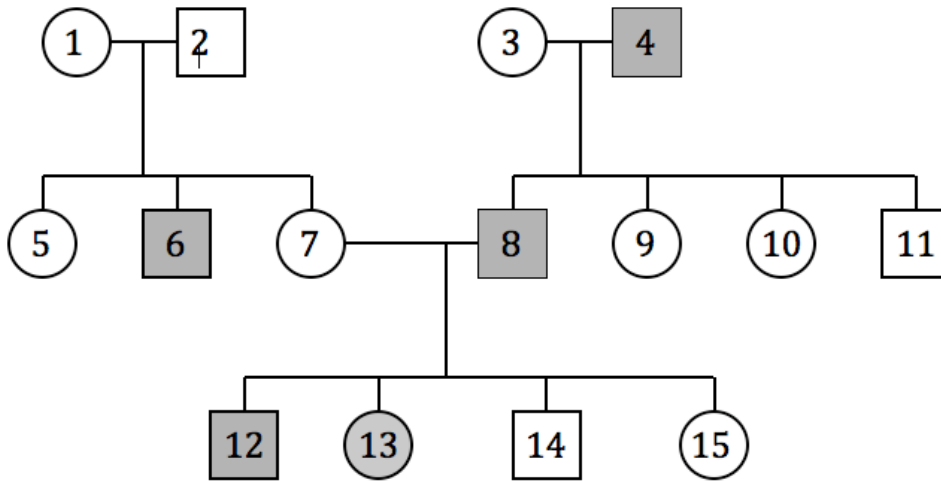


## Genetics Practice Problems: Pedigree Tables

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.

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?

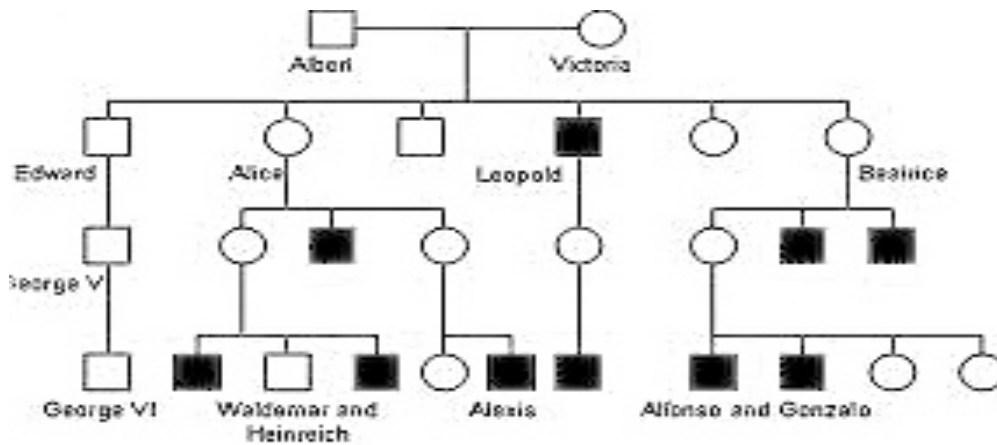
Number 8 was colorblind just like his father. Where did the son at 8 get his allele for colorblindness?

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

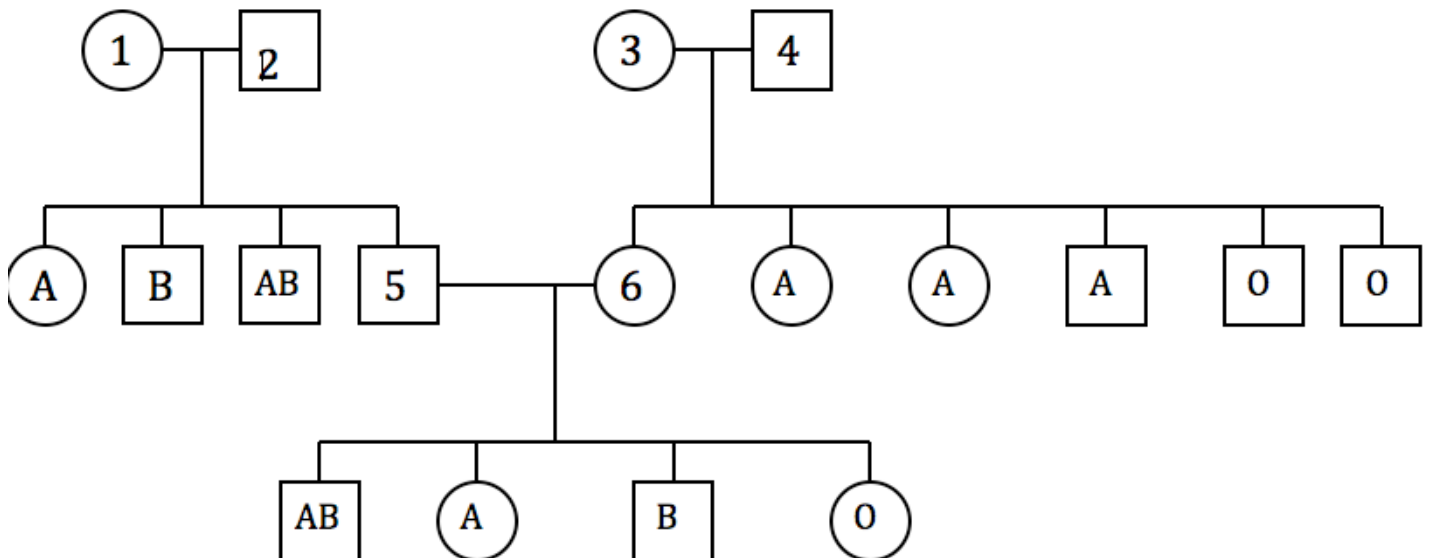
What must be the genotypes of the parents of a colorblind daughter? Explain.

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

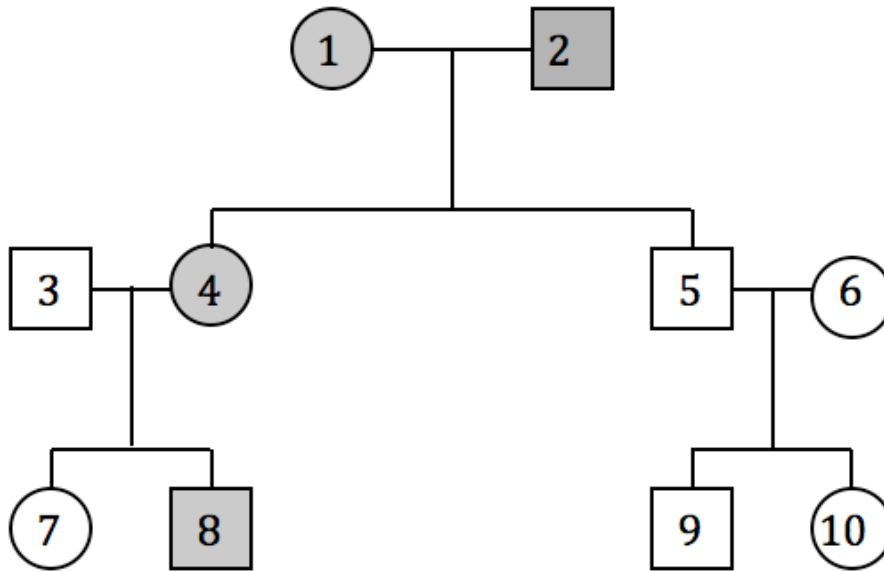
Queen Victoria was the world's most famous carrier of hemophilia. Her son, Leopold, and two carrier daughters, Alice and Beatrice, spread the gene fairly widely through the royal families of Europe, Prussia and Russia. Fortunately, no modern monarchs have inherited the allele. Indicate the probably genotype of each of the people below. Remember, hemophilia is a sex-linked trait and 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 the individuals 1 - 6? Give the probable genotype of all other family members.



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 probably genotype of each individual?



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

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

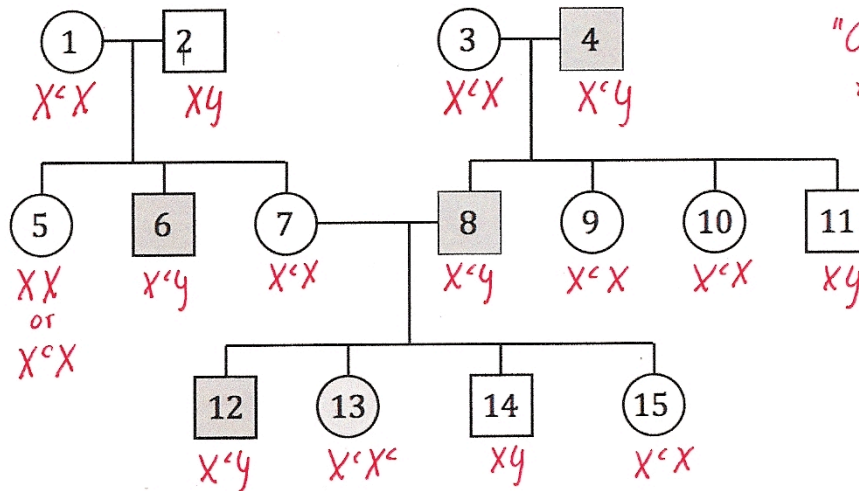
What is the probability of the trait appearing in offspring if 8 should marry 10?

## Genetics Practice Problems: Pedigree Tables

Remember the following when working pedigree tables:

- 1) Circles are females and squares are males.
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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.



The absence of a capital "C" on the X indicates the allele for normal vision. I was trying to avoid any confusion between upper and lower case "c".

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

This 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 gene for colorblindness?

He 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.

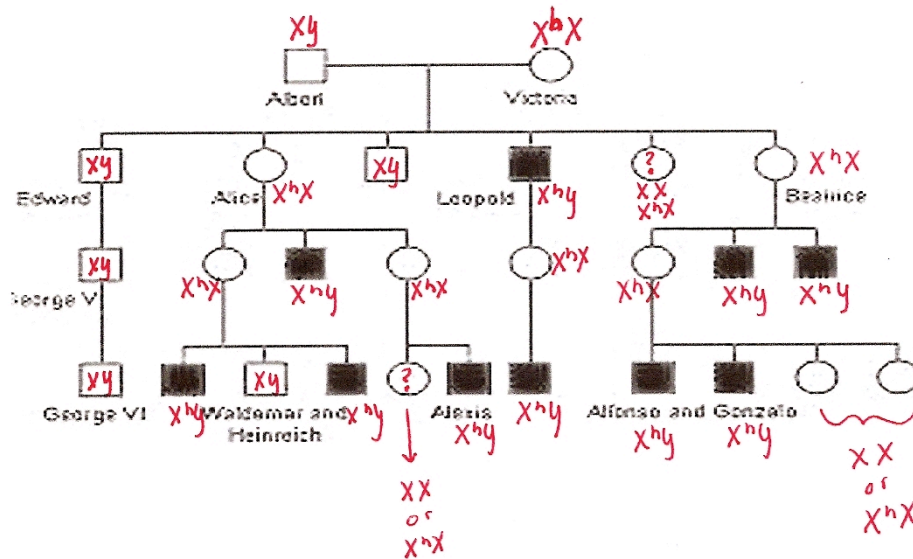
What must be the genotypes of the parents of a colorblind daughter? Explain.

To have a colorblind daughter, she would have to inherit the colorblind allele from each parent. Her father must be  $X^cy$  and the mother would have to be  $X^cX$  or  $X^cX^c$ .

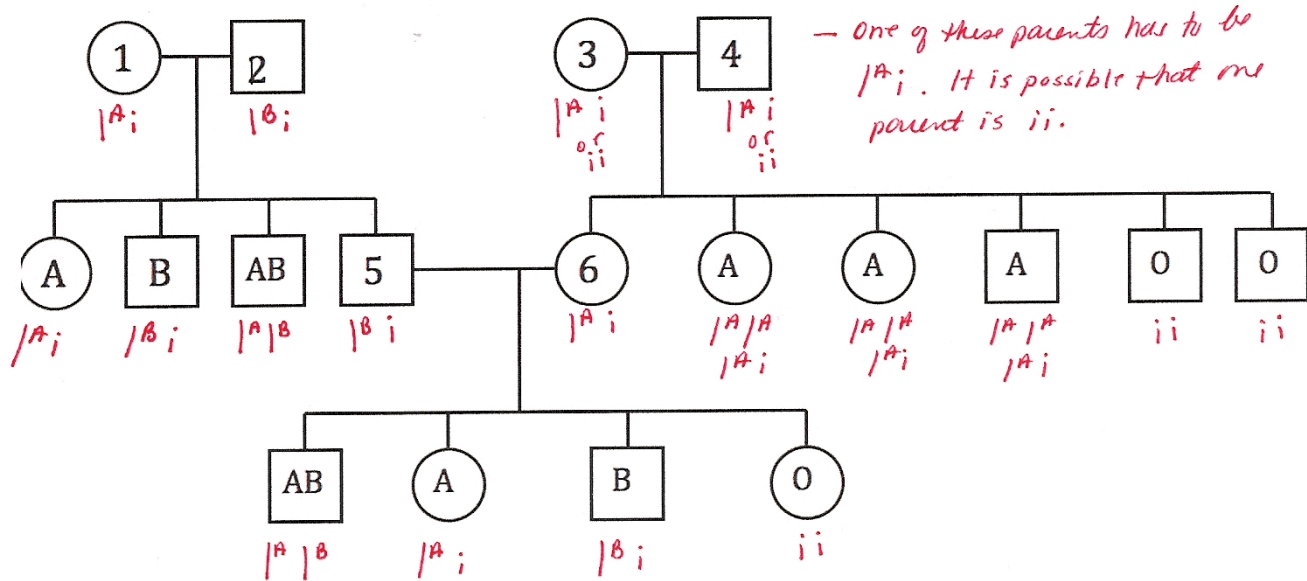
If number 13 marries a normal man, what is the probability that their sons will be colorblind?

$X^cX^c$  (13) x  $Xy$  (normal man)  $\rightarrow$  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 gene fairly widely through the royal families of Europe, Prussia and Russia. Fortunately, no modern monarchs have inherited the allele. Indicate the probably genotype of each of the people below. Remember, hemophilia is a sex-linked trait and shaded individuals have the disease.



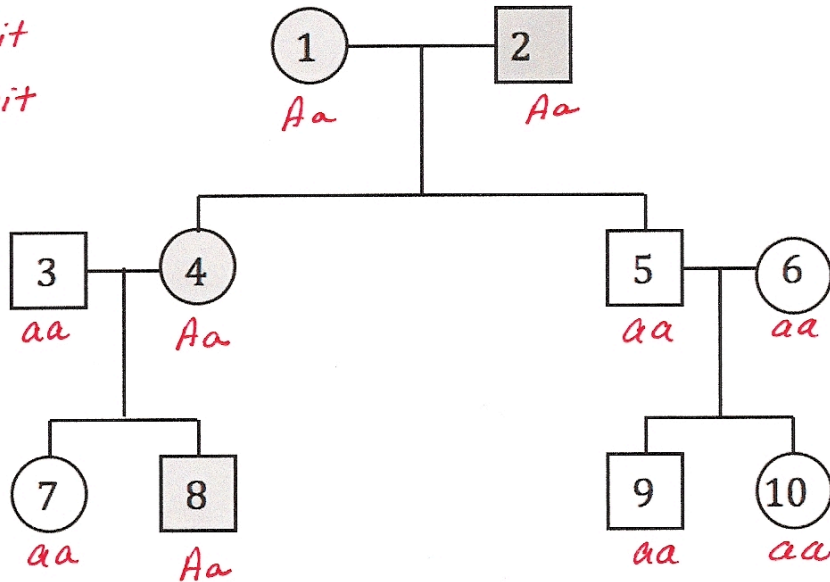
The pedigree table below shows the blood types of three generations of family members. Notice that some of the blood type phenotypes have been given to you. What is the genotype of the individuals 1 – 6? Give the probable genotype of all other family members.



Note: It is possible that #1 or #2 is  $I^A I^B$   
 There is not always one definite answer. I like the way students are made to consider all the possibilities.

The trait represented by the colored circles and squares below is inherited as a dominant gene. This is not a sex-linked trait. Shaded individuals show the dominant trait. What is the probably 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 x aa*  
*(7) (9)*

*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 x aa*  
*(8) (10)*

	A	a
a	Aa	aa
a	Aa	aa

*There is a 50% chance of the trait appearing in the offspring.*