



# High School Science Virtual Learning

## **Biology**

### **Family Trees**

**May 5, 2020**



# High School General Biology

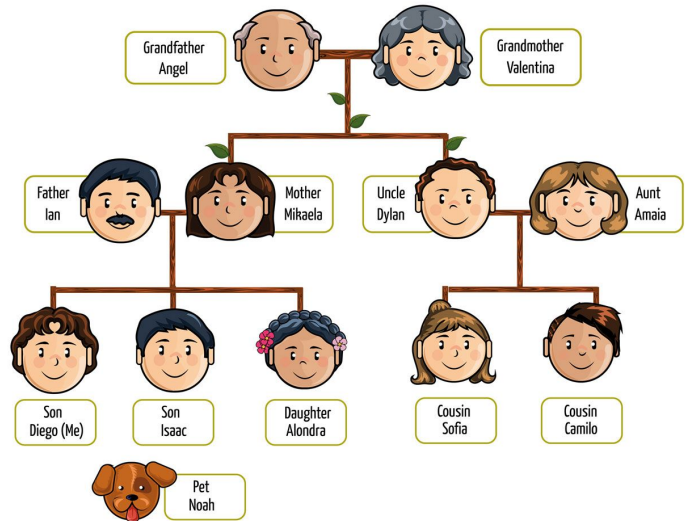
## Lesson: May 5, 2020

### Objective/Learning Target:

Students will be able to read and understand a pedigree chart.

## Bell Ringer Activity

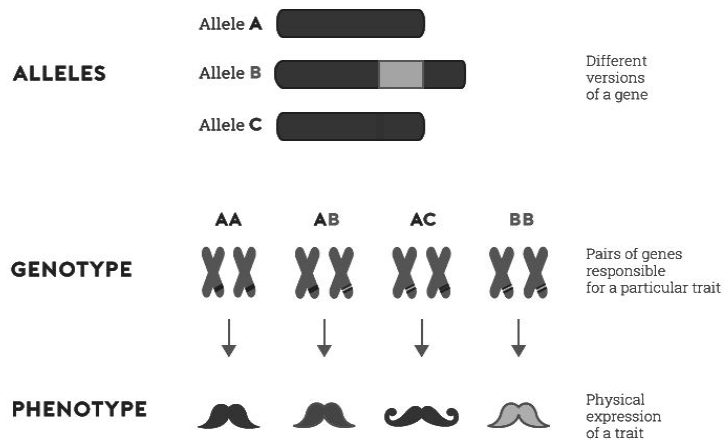
1. What does it mean to have a recessive allele?
2. What is the difference between a genotype and a phenotype?



## Bell Ringer Answers

1) An allele that is masked when a dominant allele is present.

2) An organism's genotype is the set of genes in its DNA responsible for a particular trait. An organism's phenotype is the physical expression of those genes



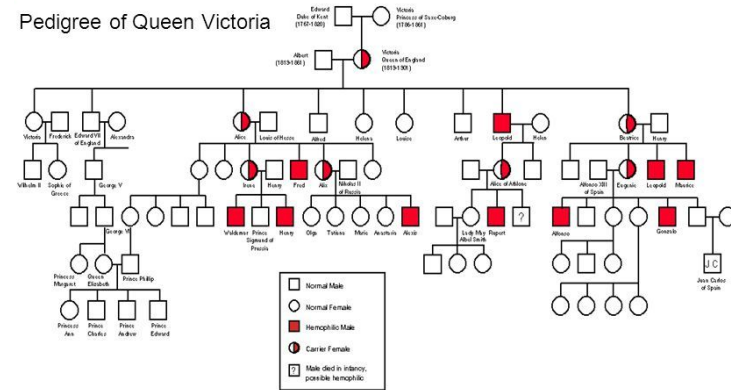
# Let's Get Started!

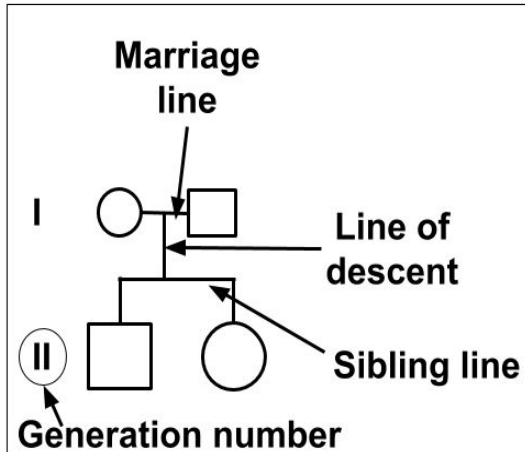
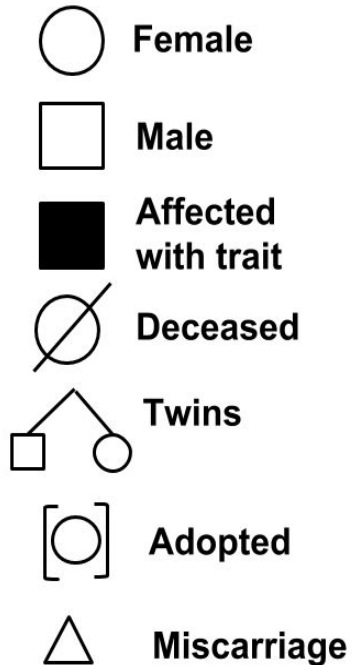
## Lesson: Family Trees

How can pedigrees be used to analyze human inheritance? A pedigree is a chart, much like a family tree, which shows all of the known individuals within a family with a particular phenotype. Family pedigrees provided evidence of Mendelian inheritance in humans. Examples of autosomally inherited disorders include cystic fibrosis, Tay-Sachs disease, phenylketonuria, and achondroplasia.

## Pedigree Analysis

Pedigree of Queen Victoria





## Lesson continued

When reading a pedigree chart, it is important to remember that the lines represent the relationships and the shape represent the person. A female is usually presented as a circle and a male is indicated with a square. If the the shape is not filled in, the trait is not seen; the person is unaffected. If the trait is filled in, the trait is seen; the person is affected.

## Lesson Continued

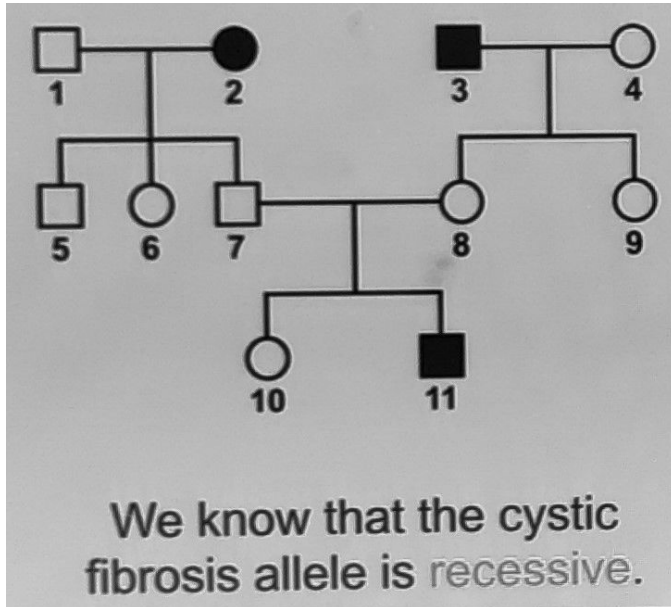
As you watch this video, listen for:

1. How inherited disorders caused by a recessive gene are passed on to the next generation.
2. How inherited disorders caused by a dominant gene are passed on to the next generation.

□ male without cystic fibrosis    ○ female without cystic fibrosis    ■ male with cystic fibrosis    ● female with cystic fibrosis

1 2 3 4 5 6 7 8 9 10 11

Work out the **genotype** of person 2.



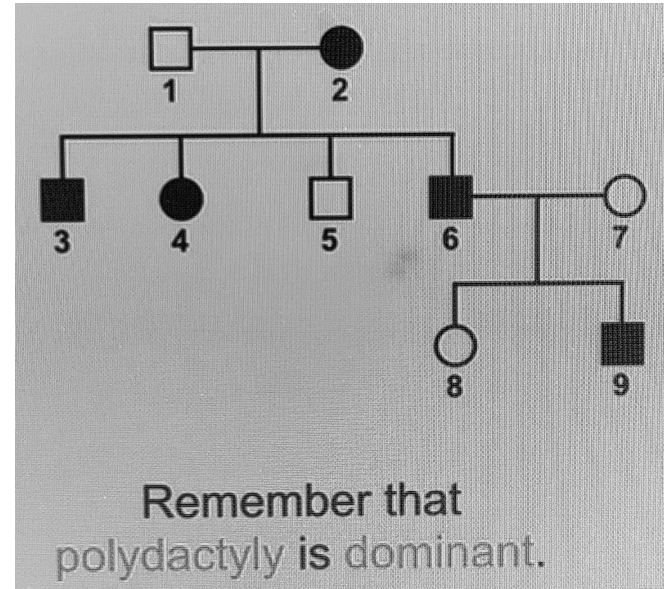
## Lesson Questions Answers

1. Recessive genetic diseases (such as cystic fibrosis) are typically not seen in every generation of an affected family. The parents of an affected person are generally carriers: unaffected people who have a copy of a mutated gene. If both parents are carriers of the same mutated gene and both pass it to the child, the child will be affected.

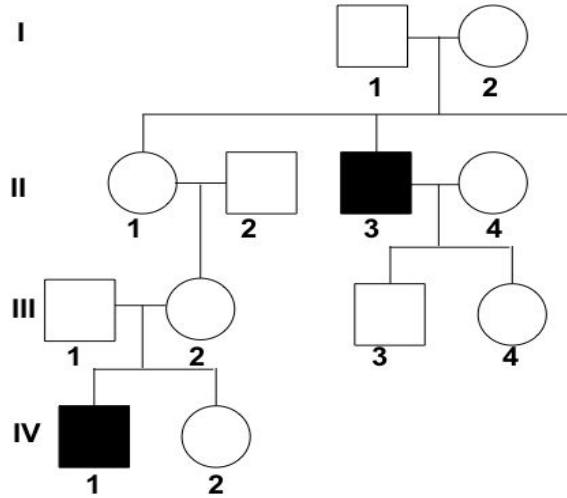


## Lesson Questions Answers Continued

2. Dominant mutations are expressed when only one copy of that mutation is present. Therefore, anyone who inherits one dominant disorder mutation (such as the mutation for polydactyly) will have that condition. Dominantly inherited genetic diseases tend to occur in every generation of a family.



## Practice Questions

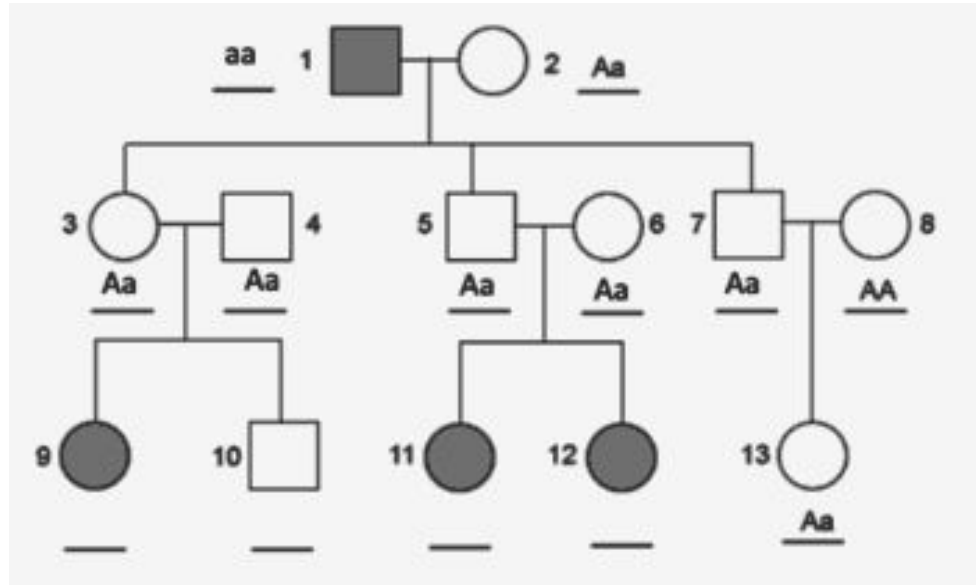


1. If a trait SKIPS a generation, it is an indication that the trait is....
  - A. Dominant
  - B. Recessive
  - C. incompletely dominant
  - D. co-dominant

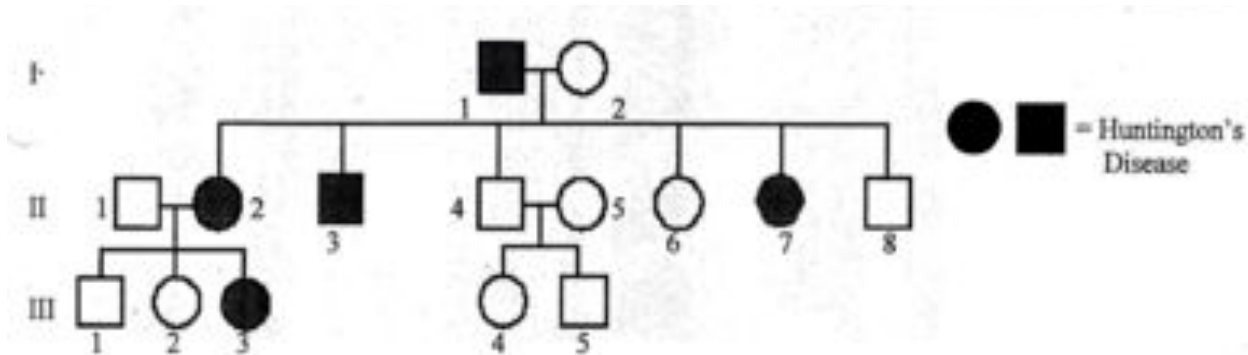
2. Cystic fibrosis is an autosomal recessive disease .

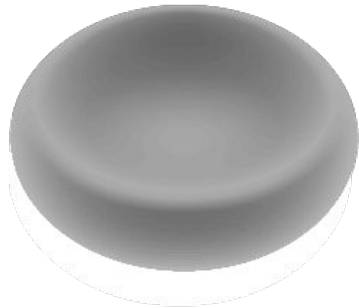
Study the pedigree what is the genotype of #9?

- A. AA
- B. Aa
- C. aa
- D.  $X^aX^a$

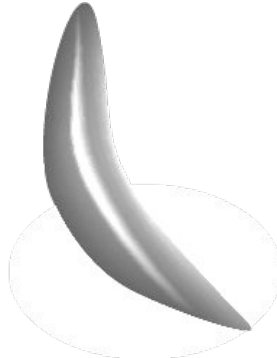


3. There are no carriers for Huntington's Disease- you either have it or you don't. Is Huntington's disease caused by a dominant or recessive trait?





**Normal  
red blood cell**



**Sickle  
cell**

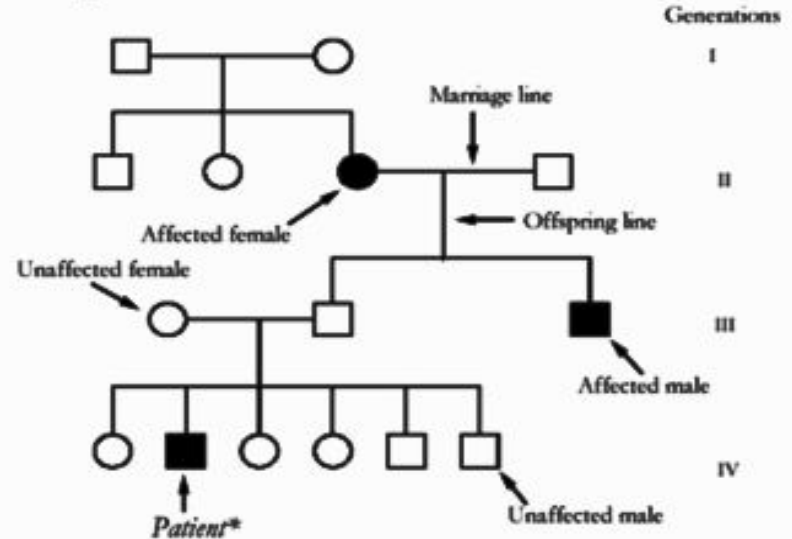
4. Considering that the sickle cell allele is recessive, give a probable genotype for the patient.

- A. Ss
- B. SS
- C. ss

5. The pedigree represent the occurrence of sickle cell disease in a family. How are individuals with sickle cell represented in the pedigree?

- A. Filled in with black
- B. Blank Space

**Model 1 – Pedigree of Sickle Cell in Four Generations**



## Answers to Practice Questions

1. B-Recessive
2. C-aa
3. Dominant
4. C-ss
5. A-Filled in with black

## Common Misconception

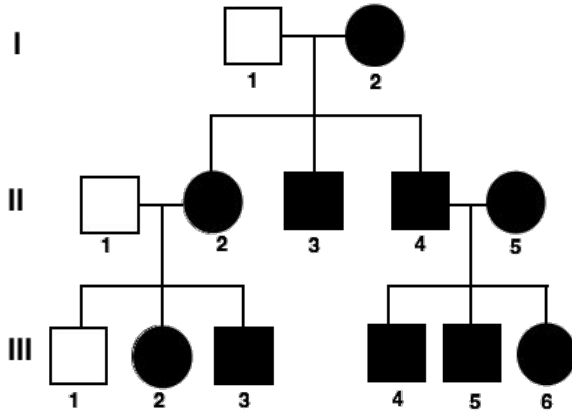
- “DNA testing will reveal my health information.” - One of the driving forces behind sequencing the first human genome was to use the information to understand the causes of disease and to find cures or treatments, so most genetic testing was done for medical reasons. However, scientists have discovered that the correlation between health and genetics is complex and that the environment plays a large role in determining our health. With the rare exception of individuals with genetic diseases, a DNA test cannot reveal our major illnesses or eventual cause of death.



## More Practice

Follow the links below to do more practice.

1. [Probability: Was it Grandma or Grandpa?](#)
2. [Pedigree Practice](#)



## Additional Resources

[Khan Academy - Pedigrees](#)

[Amoeba Sisters - Pedigrees](#)