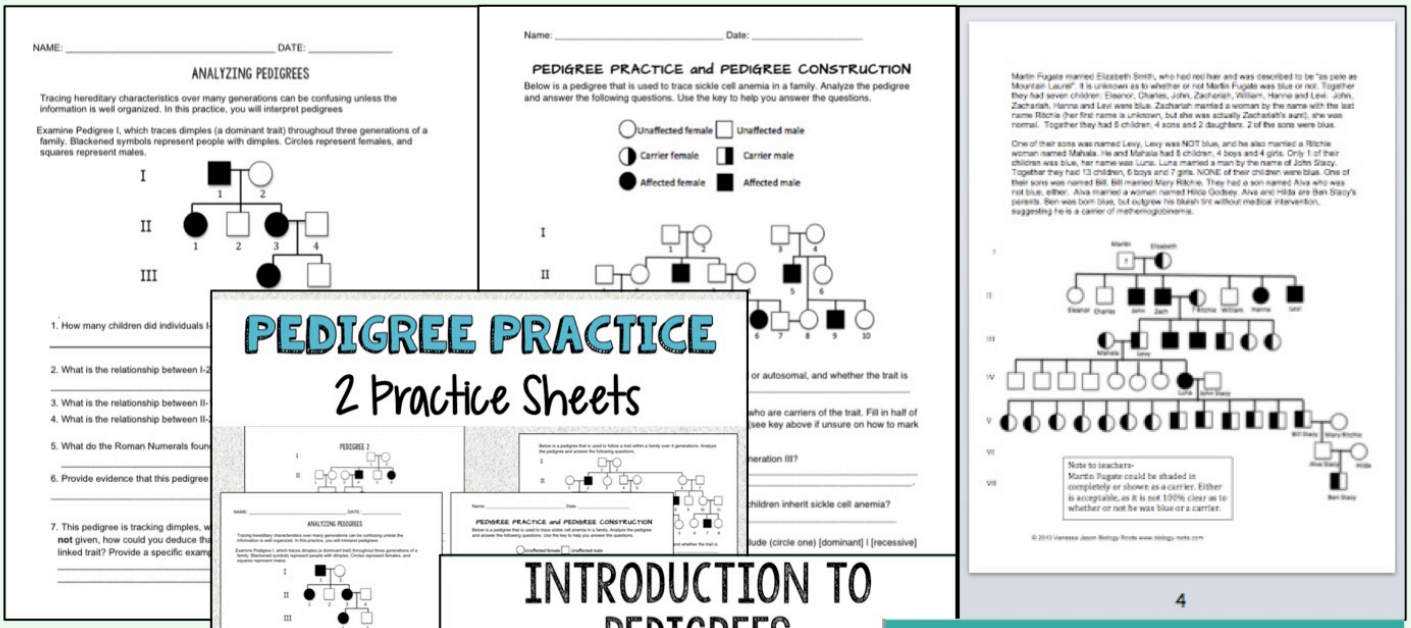
# pedigree

## Activity Pack

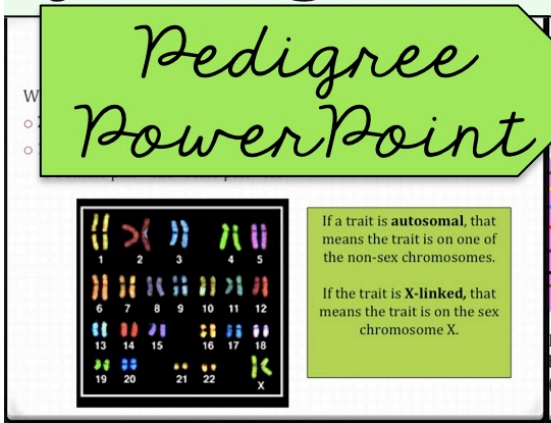


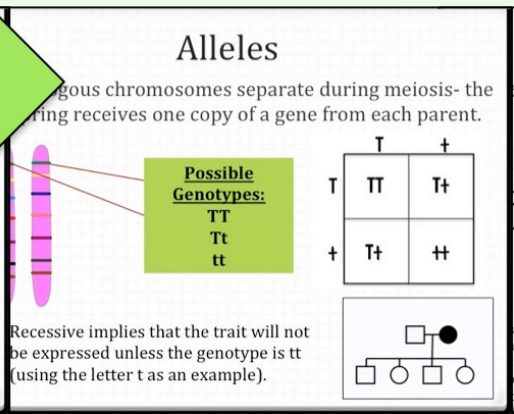

Editable versions for most.
Answer keys included.
Grades 7 and up

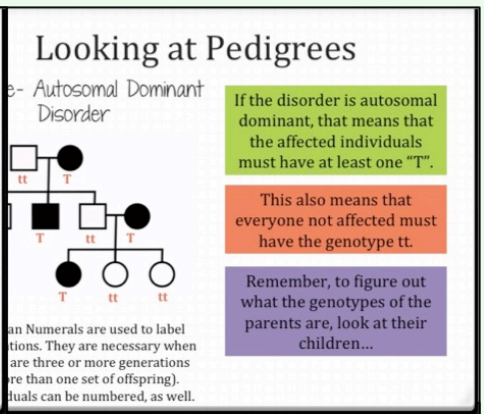
biology roots

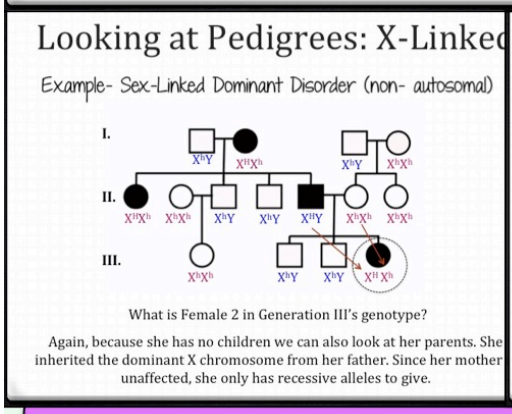
# pedigrees

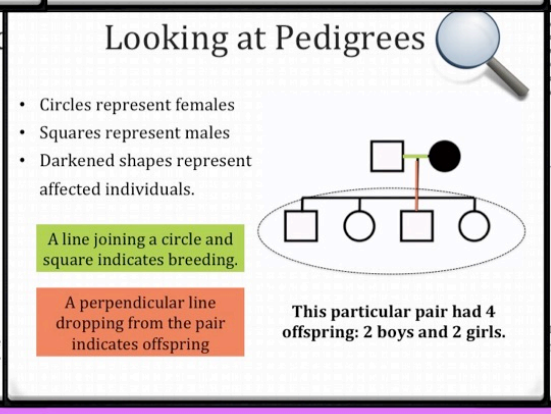
## Pedigree PowerPoint

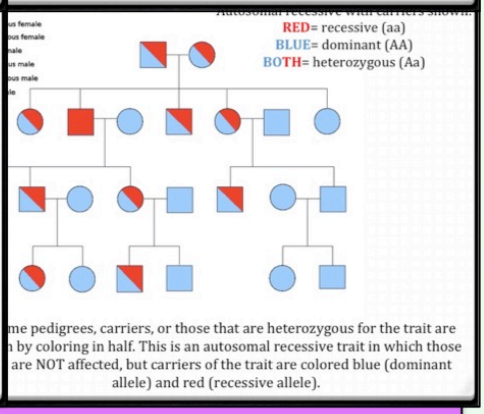


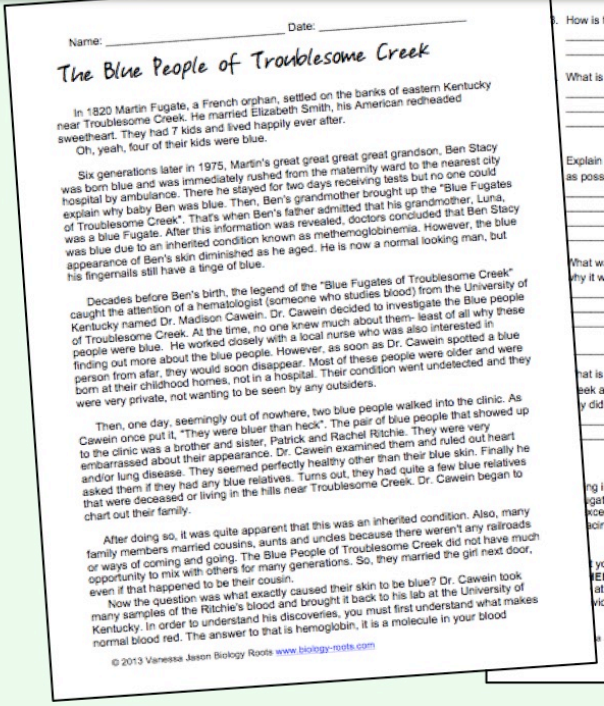




Student notes included -- 24 slides

## The Blue People Of Troublesome Creek



Name: _____ Date: _____

The Blue People of Troublesome Creek

In 1820 Martin Fugate, a French orphan, settled on the banks of eastern Kentucky near Troublesome Creek. He married Elizabeth Smith, his American redheaded sweetheart. They had 7 kids and lived happily ever after.

Oh, yeah, four of their kids were blue.

Six generations later in 1975, Martin's great great great great grandson, Ben Stacy was born blue and was immediately rushed from the maternity ward to the nearest city hospital by ambulance. There he stayed for two days receiving tests but no one could explain why baby Ben was blue. Then, Ben's grandmother brought up the "Blue Fugates of Troublesome Creek". That's when Ben's father admitted that his grandmother, Luna, was a blue Fugate. After this information was revealed, doctors concluded that Ben Stacy was blue due to an inherited condition known as methemoglobinemia. However, the blue appearance of Ben's skin diminished as he aged. He is now a normal looking man, but his fingernails still have a tinge of blue.

Decades before Ben's birth, the legend of the "Blue Fugates of Troublesome Creek" caught the attention of a hematologist (someone who studies blood) from the University of Kentucky named Dr. Madison Cawein. Dr. Cawein decided to investigate the Blue people of Troublesome Creek. At the time, no one knew much about them- least of all why these people were blue. He worked closely with a local nurse who was also interested in finding out more about the blue people. However, as soon as Dr. Cawein spotted a blue person from afar, they would soon disappear. Most of these people were older and were born at their childhood homes, not in a hospital. Their condition went undetected and they were very private, not wanting to be seen by any outsiders.

Then, one day, seemingly out of nowhere, two blue people walked into the clinic. As Cawein once put it, "They were bluer than heck". The pair of blue people that showed up to the clinic was a brother and sister, Patrick and Rachel Ritchie. They were very embarrassed about their appearance. Dr. Cawein examined them and ruled out heart and/or lung disease. They seemed perfectly healthy other than their blue skin. Finally he asked them if they had any blue relatives. Turns out, they had quite a few blue relatives that were deceased or living in the hills near Troublesome Creek. Dr. Cawein began to chart out their family.

After doing so, it was quite apparent that this was an inherited condition. Also, many family members married cousins, aunts and uncles because there weren't any railroads or ways of coming and going. The Blue People of Troublesome Creek did not have much opportunity to mix with others for many generations. So, they married the girl next door, even if that happened to be their cousin.

Now the question was what exactly caused their skin to be blue? Dr. Cawein took many samples of the Ritchie's blood and brought it back to his lab at the University of Kentucky. In order to understand his discoveries, you must first understand what makes normal blood red. The answer to that is hemoglobin, it is a molecule in your blood

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How is this molecule different from hemoglobin?

What is the role of the enzyme diaphorase?

Explain why the Blue People of Troublesome creek were blue in as possible:

What was the cure for methemoglobinemia? (Extra points if you why it was "ironic" ☺).

hat is the reason that methemoglobinemia was isolated to Tro eek area of KY? (In other words why was the disorder only pre y didn't other states see cases?)

ng is an excerpt of a *partial* pedigree for gates of Troublesome Creek. xcerpt carefully, and use it to construct a oing methemoglobinemia in the space

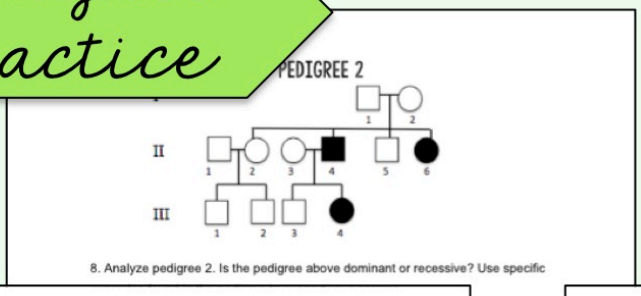
your pedigree is clearly labeled. **USE EN GIVEN.** at right to depict males, females and viduals.

AFFECTED MALE
UNAFFECTED MALE
CARRIER MALE
AFFECTED FEMALE
UNAFFECTED FEMALE
CARRIER FEMALE

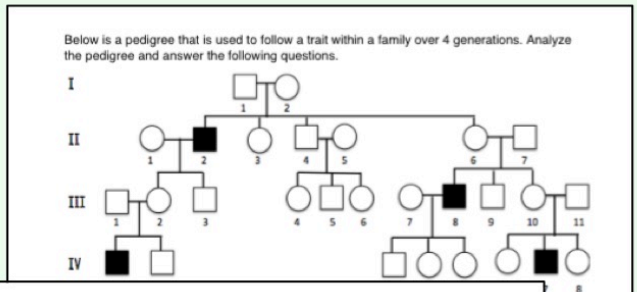
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# Pedigree Practice


PEDIGREE 2

8. Analyze pedigree 2. Is the pedigree above dominant or recessive? Use specific

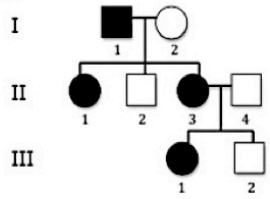

Below is a pedigree that is used to follow a trait within a family over 4 generations. Analyze the pedigree and answer the following questions.

NAME: _____ DATE: _____

## ANALYZING PEDIGREES

Tracing hereditary characteristics over many generations can be confusing unless the information is well organized. In this practice, you will interpret pedigrees

Examine Pedigree I, which traces dimples (a dominant trait) throughout three generations of a family. Blackened symbols represent people with dimples. Circles represent females, and squares represent males.



1. How many children did individuals I-1 and I-2 have? Include their sexes.

_____

2. What is the relationship between I-2 and III-2?

_____.

3. What is the relationship between II-1 and II-2? _____
4. What is the relationship between II-2 and III-2? _____

5. What do the Roman Numerals found in a pedigree indicate? _____

_____.

6. Provide evidence that this pedigree for a dominant trait: _____

_____.

7. This pedigree is tracking dimples, which are autosomal dominant. If this information was **not** given, how could you deduce that this was in fact an autosomal trait, and not an X-linked trait? Provide a specific example from the pedigree: _____

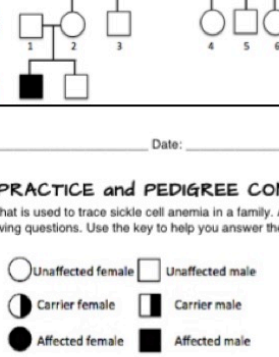
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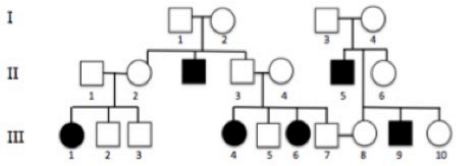
_____.

Name: _____ Date: _____

## PEDIGREE PRACTICE and PEDIGREE CONSTRUCTION

Below is a pedigree that is used to trace sickle cell anemia in a family. Analyze the pedigree and answer the following questions. Use the key to help you answer the questions.



1. Determine whether or not the trait is sex-linked or autosomal, and whether the trait is dominant or recessive: _____
2. For generations I and II, determine individuals who are carriers of the trait. Fill in half of their shape to symbolize that they are carriers (see key above if unsure on how to mark them).
3. Why can't we determine who are carriers in generation III?

_____

_____.

4. From which parent did the second-generation children inherit sickle cell anemia?

_____

5. Carriers are only depicted in pedigrees that include (circle one) [dominant] I [recessive] traits.

## Analyzing a Pedigree

## PEDIGREE PRACTICE AND Construction

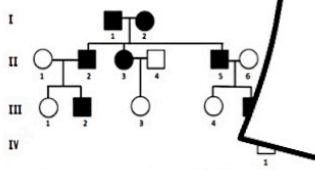
# Pedigree Quiz

Name: _____ Date: _____

## QUIZ: PEDIGREES

1. What are pedigrees used for?
2. Make a key for the following: unaffected female/male; carrier female/male; affected female/male.

Answer the following questions based on the pedigree below:



3. Is this mostly likely a pedigree for a dominant or recessive trait?

_____

4. What is the relationship between I-1 and III-3?

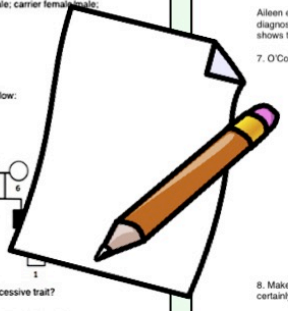
_____

5. What are the genotypes for II-1, III-1, and IV-1?

_____

6. What are the genotypes for the first generation parents (I-1 and I-2)?

_____



Cystic fibrosis is an inherited disease caused by a recessive defective gene that causes thick, sticky mucus to build up in the lungs and digestive tract. It is one of the most common genetic disorders in Caucasians.

Mr. and Mrs. O'Connor have three children, two sons and a daughter. After going through a series of genetic tests years ago during adolescence, it was conclusive that their eldest son Michael had this defective gene. Their daughter Aileen was shown to be a carrier for the disorder, and their youngest son showed no signs of having the gene.

Aileen eventually married and had two daughters, one of which was recently diagnosed with cystic fibrosis. Using the space below, construct a pedigree that shows the inheritance of this recessive gene within the O'Connor family.

7. O'Connor Family Pedigree for Cystic Fibrosis:

8. Make some adjustments to your pedigree by shading those that are most certainly heterozygous for cystic fibrosis.

9. Provide evidence from your pedigree that this a recessive trait.

10. Provide evidence from your pedigree that this is an autosomal (and not X-linked) trait:

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