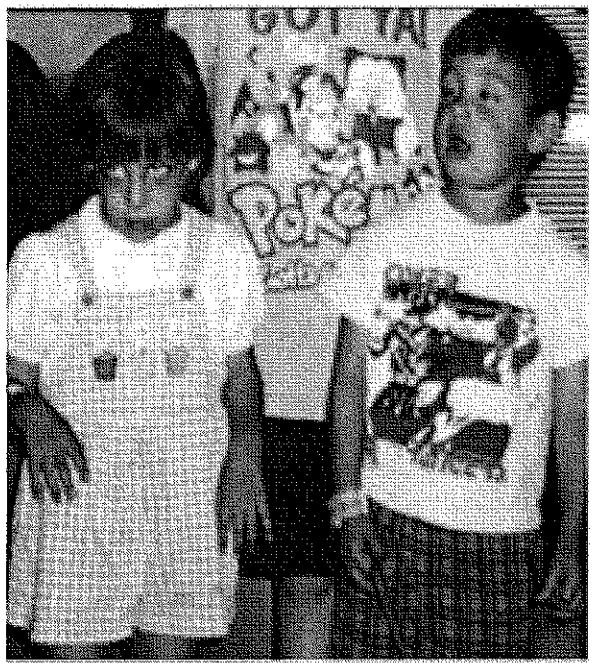


What's Going On with the Beery Twins?

ENGAGE

The Beery twins are fraternal twins (one male and one female) that had developmental delays, poor muscle control, excessive crying and frequent vomiting. Their older brother and parents appear to be unaffected and did not exhibit any of these symptoms.



Formative Exploration Assessment Probe

EXPLORE

Examine the photo of Alexis and Noah Beery.

- A. Make at least three observations about the twin's condition.
 - a. . Most likely a mental development issue.
 - b. . Most likely not hereditary
 - c. . Seems to be affecting both children differently
- B. Ask at least three questions you might have about the twin's condition.
 - a. . Is it a chromosomal mutation / sex-linked
 - b. . Are they able to communicate
 - c. . Chance of survival
- C. Predict what you think may have caused the Beery Twin's condition.

Either a mutation of the genes caused delayed development, or there was a complication at birth during pregnancy.
- D. What further information you need to know to determine the cause of their condition?

Conditions of birth / pregnancy: brain scan to see ability.

~~Handwritten scribbles and crossed-out text at the bottom of the page.~~

EXPLAIN

Pedigree Analysis: Analyze the pedigree below, and consider the following:

- Describe what is meant by each of the symbols (circle vs. square, color, letters, etc.)

*Circle female
square - male
look at key*

- What medical conditions were found in the twin's relatives, on both mom and dad's side of the family?

*Fibromyalgia
depression
other neurological disorders.*

- Predict if the Beery twins' condition is dominant or recessive? Create a Punnett square to support your claim.

Recessive

	A	a	
A	AA	Aa	
a	Aa	aa	<i>gets DRD</i>

- We know now this appears to be a genetic disorder. Propose what steps you would take to further investigate this condition.

See if it's sex linked or autosomal

~~_____~~

II. The Beery Family Pedigree

Further examination of the Beery Family pedigree shows a family history of depression on the paternal side and a history of fibromyalgia and undisclosed neurological disorder on the maternal side, in addition to DRD in the twins.

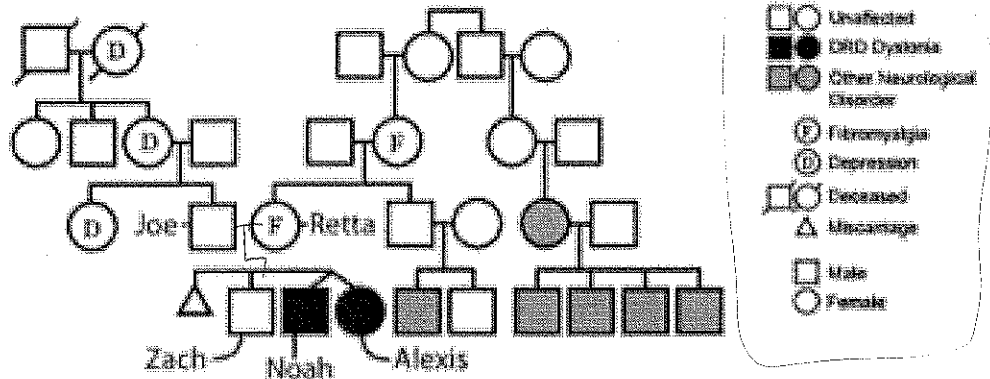


Figure 1. Pedigree of a Family

ELABORATE

By now you have discovered that the Beery family consists of the parents, Retta and Joe, and three children: Zach, Noah and Alexis. The immediate family underwent whole genome sequencing that revealed the sequences of each member's DNA. The significant results from that genome sequencing are shown on the right. Read and analyze the experimental data and address the questions below.

5. Analyze Figure 2.

a. Compare Retta's peaks in column one to the rest of her family. Which family members share the most similarities to Retta?

Zach

b. Next, compare the peaks in column one to Joe's pattern. Which family members share the most similarities to Joe?

Alexis + Noah

c. Now compare Retta's peaks in column two to the rest of her family. Which family members share the most similarities to Retta?

Alexis + Noah

d. Finally, compare the peaks in column two to Joe's pattern. Which family members share the most similarities to Joe?

Zach

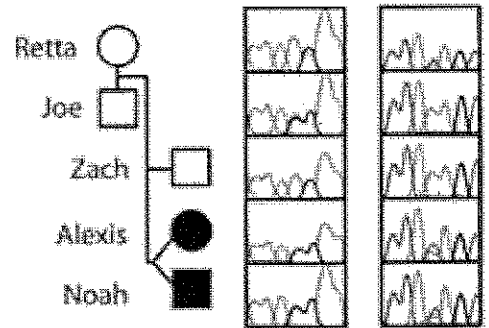


Figure 2: Results of a genome sequencing comparing each member of the Beery family two points on the gene located on chromosome 2

6. Keeping in mind that Zach appears to be unaffected, what does this sequencing data reveal about the twins?

The combination of differences on both locations of the x-some caused their condition.

EVALUATE

7. Create a model of Joe's chromosome 2 which demonstrates his genotype for the targeted trait.



8. Create a model of Retta's chromosome which demonstrates her genotype for the targeted trait.

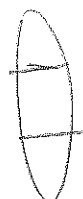


9. Using the model created above predict the combination of chromosomes inherited by Zach, Noah and Alexis.

Zach



Alexis + Noah

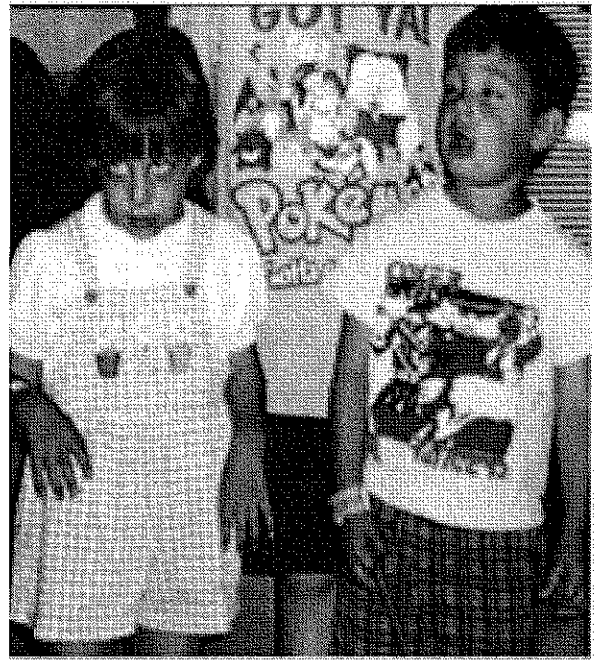


Kind of confusing

What's Going On with the Beery Twins?

ENGAGE

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Formative Exploration Assessment Probe

EXPLORE

Examine the photo of Alexis and Noah Beery.

A. Make at least three observations about the twin's condition.

- a. . inability to make eye contact
- b. . poor muscle control
- c. . issues w/focus

B. Ask at least three questions you might have about the twin's condition.

- a. . Is their condition connected to the fact that they're twins?
- b. . Are either one of their parents carriers of the condition?
- c. . How long have they exhibited those symptoms?

C. Predict what you think may have caused the Beery Twin's condition.

Genetic issue that developed in the womb,
possibly connected to the fact that they're twins

D. What further information you need to know to determine the cause of their condition?

Karyotype, brain functioning

EXPLAIN

Pedigree Analysis: Analyze the pedigree below, and consider the following:

already mentioned in class

- Describe what is meant by each of the symbols (circle vs. square, color, letters, etc.)

what do you want different from the key?

- What medical conditions were found in the twin's relatives, on both mom and dad's side of the family?

Dad -> depression

Mom -> Fibromyalgia

II. The Beery Family Pedigree

Further examination of the Beery Family pedigree shows a family history of depression on the paternal side and a history of fibromyalgia and undisclosed neurological disorder on the maternal side, in addition to DRD in the twins.

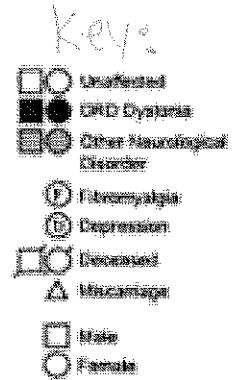
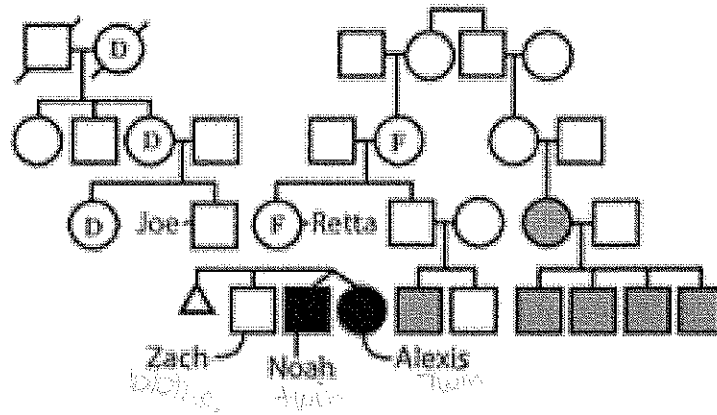
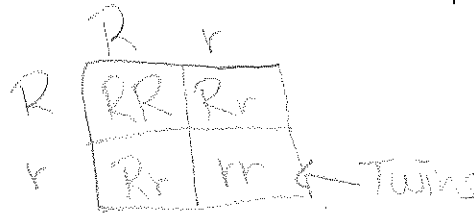


Figure 1. Pedigree of a Family²

- Predict if the Beery twins' condition is dominant or recessive? Create a Punnett square to support your claim.

Homozygous recessive condition



RR → Yes
Rr → Yes
rr → No

- We know now this appears to be a genetic disorder. Propose what steps you would take to further investigate this condition.

We would propose further diagnostic and genetic testing to examine specifically where within the twins' genes this abnormality is occurring.

ELABORATE

By now you have discovered that the Beery family consists of the parents, Retta and Joe, and three children: Zach, Noah and Alexis. The immediate family underwent whole genome sequencing that revealed the sequences of each member's DNA. The significant results from that genome sequencing are shown on the right. Read and analyze the experimental data and address the questions below.

5. Analyze Figure 2.

a. Compare Retta's peaks in column one to the rest of her family. Which family members share the most similarities to Retta?

Zach

b. Next, compare the peaks in column one to Joe's pattern. Which family members share the most similarities to Joe?

Alexis and Noah

c. Now compare Retta's peaks in column two to the rest of her family. Which family members share the most similarities to Retta?

None

d. Finally, compare the peaks in column two to Joe's pattern. Which family members share the most similarities to Joe?

Alexis, Noah, Zach

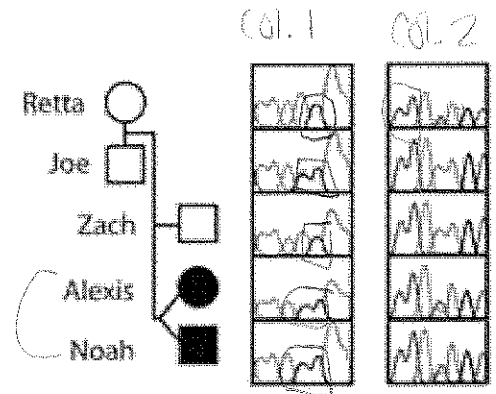


Figure 2: Results of a genome sequencing comparing each member of the Beery family two points on the gene located on chromosome 2

6. Keeping in mind that Zach appears to be unaffected, what does this sequencing data reveal about the twins?

The developed the condition from their father who is a genetic carrier of the condition.

EVALUATE

7. Create a model of Joe's chromosome 2 which demonstrates his genotype for the targeted trait.



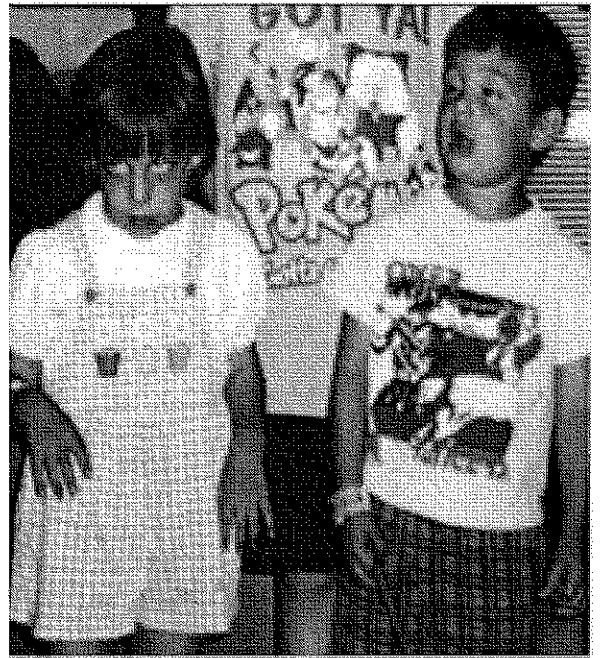
8. Create a model of Retta's chromosome which demonstrates her genotype for the targeted trait.

9. Using the model created above predict the combination of chromosomes inherited by Zach, Noah and Alexis.

What's Going On with the Beery Twins?

ENGAGE

The Beery twins are fraternal twins (one male and one female) that had developmental delays, poor muscle control, excessive crying and frequent vomiting. Their older brother and parents appear to be unaffected and did not exhibit any of these symptoms.



Formative Exploration Assessment Probe

EXPLORE

Examine the photo of Alexis and Noah Beery.

A. Make at least three observations about the twin's condition.

- a. . Muscle contraction
- b. . Eye condition
- c. . Slouching (spine condition)

B. Ask at least three questions you might have about the twin's condition.

- a. . What's the family history?
- b. . When did symptoms first appear?
- c. . When did the condition develop?

C. Predict what you think may have caused the Beery Twin's condition.

Genetic mutation

D. What further information you need to know to determine the cause of their condition?

Genetic coding, family history, mother's use of
drugs / drugs, mother's condition, labor
birth

EXPLAIN

Pedigree Analysis: Analyze the pedigree below, and consider the following:

- Describe what is meant by each of the symbols (circle vs. square, color, letters, etc.)
Circle - women
Square - male
D - have depression
F - Fibromyalgia

II. The Beery Family Pedigree

Further examination of the Beery Family pedigree shows a family history of depression on the paternal side and a history of fibromyalgia and undisclosed neurological disorder on the maternal side, in addition to DRD in the twins.

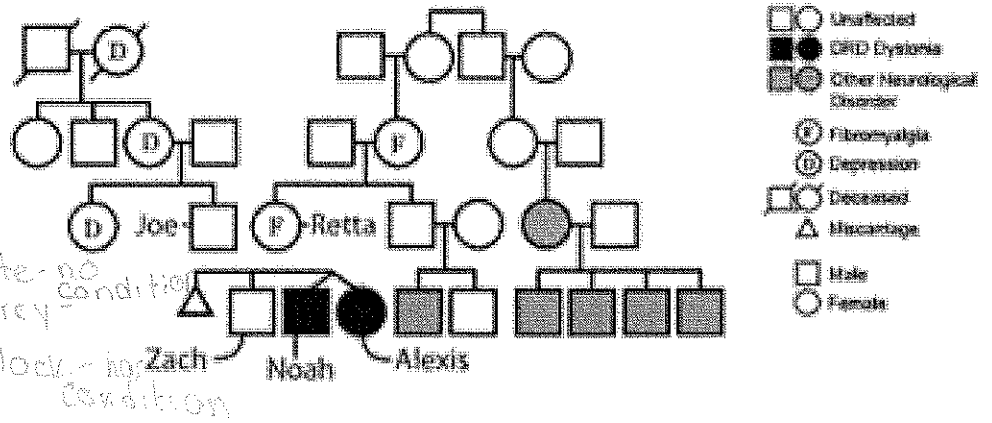
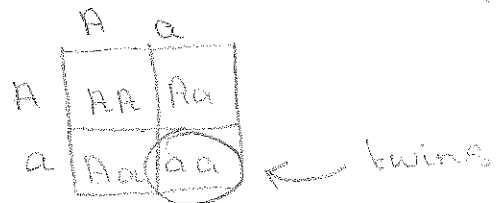


Figure 1. Pedigree of a Family¹

3 of 4 are Fibromyalgia

- Predict if the Beery twins' condition is dominant or recessive? Create a Punnett square to support your claim.

Recessive



- We know now this appears to be a genetic disorder. Propose what steps you would take to further investigate this condition.

Look at genetic coding to see where there is a mutation.

~~Retta~~ ~~Joe~~ ~~Zach~~ ~~Alexis~~ ~~Noah~~

ELABORATE

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5. Analyze Figure 2.
 - a. Compare Retta's peaks in column one to the rest of her family. Which family members share the most similarities to Retta?
Zach
 - b. Next, compare the peaks in column one to Joe's pattern. Which family members share the most similarities to Joe?
Noah, Alexis
 - c. Now compare Retta's peaks in column two to the rest of her family. Which family members share the most similarities to Retta?
Alexis + Noah
 - d. Finally, compare the peaks in column two to Joe's pattern. Which family members share the most similarities to Joe?
Zach

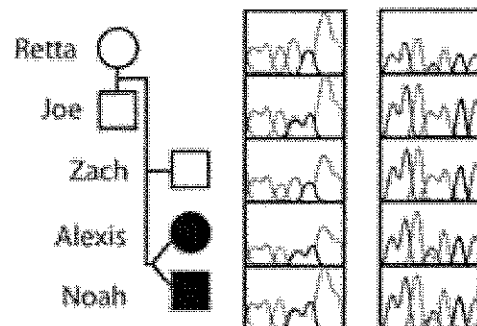




Figure 2: Results of a genome sequencing comparing each member of the Beery family two points on the gene located on chromosome 2

6. Keeping in mind that Zach appears to be unaffected, what does this sequencing data reveal about the twins?
Different mutation during gestation

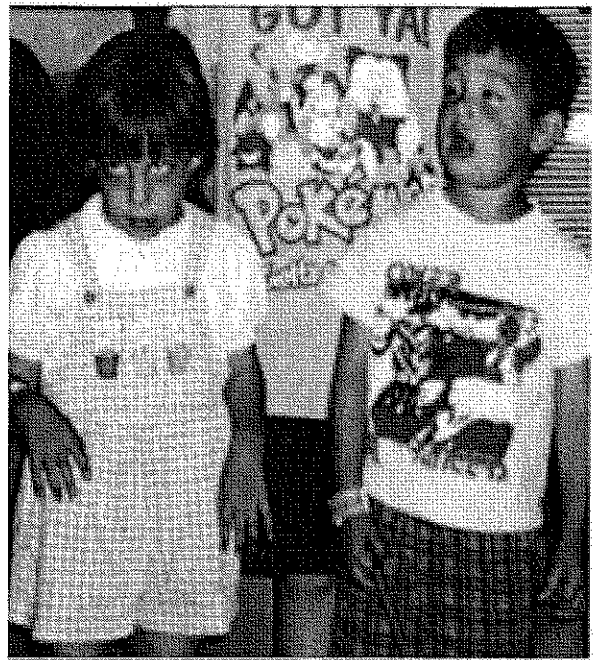
EVALUATE

7. Create a model of Joe's chromosome 2 which demonstrates his genotype for the targeted trait.

8. Create a model of Retta's chromosome which demonstrates her genotype for the targeted trait.

9. Using the model created above predict the combination of chromosomes inherited by Zach, Noah and Alexis.

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ENGAGE

The Beery twins are fraternal twins (one male and one female) that had developmental delays, poor muscle control, excessive crying and frequent vomiting. Their older brother and parents appear to be unaffected and did not exhibit any of these symptoms.



Formative Exploration Assessment Probe

EXPLORE

Examine the photo of Alexis and Noah Beery.

- A. Make at least three observations about the twin's condition.

- Their hands are tense
- Mouths open / puff cheeks
- Eyes look incoherent

- B. Ask at least three questions you might have about the twin's condition.

- Was their condition inherited?
- Will their condition affect their lifespan?
- How common is it?

- C. Predict what you think may have caused the Beery Twin's condition.

Some kind of complications with fetal development

- D. What further information you need to know to determine the cause of their condition?

- The pedigree of the family
- Placental strip records & notes
- Glass tests
- Urine - Glucose

- how do balance 1 drop for addicts. w/ therapeutic dose?

EXPLAIN

Pedigree Analysis: Analyze the pedigree below, and consider the following:

- Describe what is meant by each of the symbols (circle vs. square, color, letters, etc.)

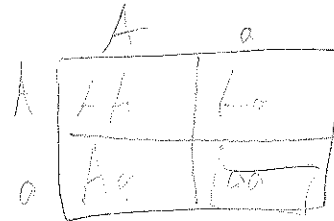
in the key

- What medical conditions were found in the twin's relatives, on both mom and dad's side of the family?

*Depression,
Fibromyalgia
Neurological disorders*

- Predict if the Beery twins' condition is dominant or recessive? Create a Punnett square to support your claim.

RECESSIVE



- We know now this appears to be a genetic disorder. Propose what steps you would take to further investigate this condition.

Figure out if it's autosomal or sex-linked

II. The Beery Family Pedigree

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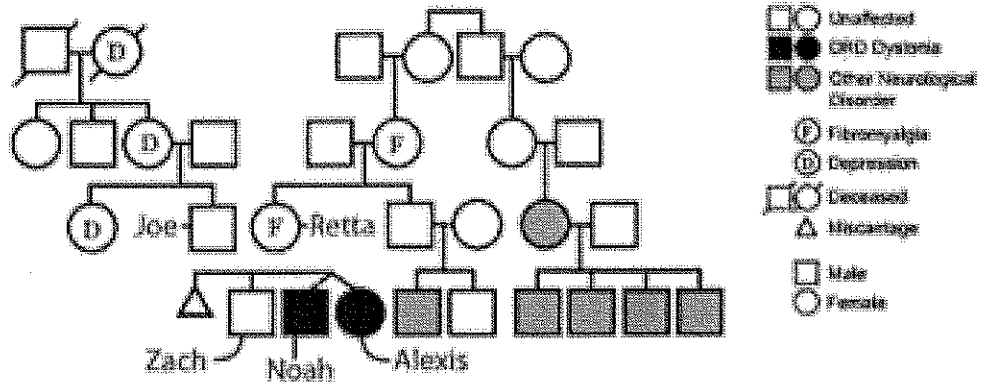


Figure 1. Pedigree of a Family¹

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5. Analyze Figure 2.

a. Compare Retta's peaks in column one to the rest of her family. Which family members share the most similarities to Retta?

5 peaks in the evidence else except zach

b. Next, compare the peaks in column one to Joe's pattern. Which family members share the most similarities to Joe?

Retta & Noah

c. Now compare Retta's peaks in column two to the rest of her family. Which family members share the most similarities to Retta?

Alexis & Noah

d. Finally, compare the peaks in column two to Joe's pattern. Which family members share the most similarities to Joe?

Zach

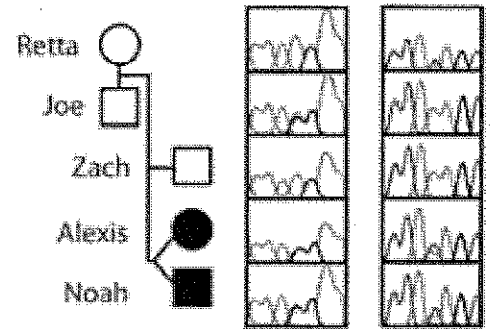


Figure 2: Results of a genome sequencing comparing each member of the Beery family two points on the gene located on chromosome 2

6. Keeping in mind that Zach appears to be unaffected, what does this sequencing data reveal about the twins?

The combined differences on the chromosomes caused the disorder.

EVALUATE

how do I make a model?

7. Create a model of Joe's chromosome 2 which demonstrates his genotype for the targeted trait.



8. Create a model of Retta's chromosome which demonstrates her genotype for the targeted trait.



9. Using the model created above predict the combination of chromosomes inherited by Zach, Noah and Alexis.

