

DNA Remix

Inheritance & Variation of Traits

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Grade Level	8th Grade	**Time Frame**	130 minutes
Subject	Science	**Duration**	3-4 class periods

Essential Question

How do genes affect the structure and function of an organism?

Summary

In this lesson students will describe where genes are located and how they influence the traits of an individual. Students will conduct research and create presentations about different genetic mutations, identify mutations as harmful, neutral, or beneficial, and understand how genes and mutations affect the structures and functions of proteins created in the DNA and change traits.

Snapshot

Engage

Students develop a Driving Question Board based on a video about different types of genetic mutations.

Explore

Students survey classmates' genetic characteristics and graph the provided data.

Explain

Students identify the different types of mutations and the impact of mutations on gene expression.

Extend

Students research, create, and showcase a presentation of a genetic mutation.

Evaluate

Students complete Fiction in the Facts to assess their knowledge of mutations.

Standards

ACT College and Career Readiness Standards - Science (6-12)

IOD403: Translate information into a table, graph, or diagram
EMI404: Identify similarities and differences between models

Oklahoma Academic Standards for Science (Grade 8)

8.LS3.1: Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

Attachments

- Fiction in the Facts —DNA Remix - Spanish.docx
- Fiction in the Facts —DNA Remix - Spanish.pdf
- Fiction in the Facts —DNA Remix.docx
- Fiction in the Facts —DNA Remix.pdf
- Lesson Slides—DNA Remix.pptx
- Mutations Presentation Instructions and Checklist—DNA Remix - Spanish.docx
- Mutations Presentation Instructions and Checklist—DNA Remix - Spanish.pdf
- Mutations Presentation Instructions and Checklist—DNA Remix.docx
- Mutations Presentation Instructions and Checklist—DNA Remix.pdf
- Notecatcher Teacher Guide—DNA Remix.docx
- Notecatcher Teacher Guide—DNA Remix.pdf
- Notecatcher—DNA Remix - Spanish.docx
- Notecatcher—DNA Remix - Spanish.pdf
- Notecatcher—DNA Remix.docx
- Notecatcher—DNA Remix.pdf
- Presentation Rubric—DNA Remix - Spanish.docx
- Presentation Rubric—DNA Remix - Spanish.pdf
- Presentation Rubric—DNA Remix.docx
- Presentation Rubric—DNA Remix.pdf
- The Legend of the First Milk Drinker—DNA Remix - Spanish.docx
- The Legend of the First Milk Drinker—DNA Remix - Spanish.pdf
- The Legend of the First Milk Drinker—DNA Remix.docx
- The Legend of the First Milk Drinker—DNA Remix.pdf
- Types of Mutations List—DNA Remix.docx
- Types of Mutations List—DNA Remix.pdf

Materials

- Lesson Slides (attached)
- The Legend of the First Milk Drinker (attached; one per student)
- Note-catcher (attached; one per student)
- Note-catcher Teacher Guide (attached)
- Mutations Presentation Instructions and Checklist (attached; one per student)
- Presentation Rubric (attached; one per student)
- Types of Mutations List (one per class—see preparation note)
- Fiction in the Facts (attached; one half-sheet per student)
- Colored pencils or markers

20 minutes

Engage

Introduce the lesson using the attached **Lesson Slides**. Display **slide 3** and read the essential question: "How do genes affect the structure and function of an organism?" Display **slide 4** to go over the lesson objectives.

Move to **slide 5**, inform students that they will watch a video about mutations. Instruct them to write down at least two questions based on the video for the upcoming discussion. Transition to **slide 6** and play the video "Uncombable Hair Syndrome and Other Rare Genetic Conditions."

Embedded video

https://youtube.com/watch?v=teoDWJPMHKM

After the video, display **slide 7** and instruct students to turn to a partner and share the questions they wrote while watching. Working together, each pair should discuss their ideas and consolidate them into three shared questions.

Next, display **slide 8.** Have each pair join another pair to form a group of four students. Within their group, students should share their questions and collaboratively select one question they believe best represents their discussion to share with the class.

Display **slide 9** and introduce the Driving Question Board strategy. Ask a representative from each group to share their selected question, and record each question on the chosen board, such as a corkboard, whiteboard, easel pad paper, or a digital slide.

Once all groups have shared their question, ask if any student would like to add a question that they feel is not yet represented on the board.

25 minutes

Explore

Display **slide 10** and distribute copies of **The Legend of the First Milk Drinker**. Have students read the story independently. After reading, ask students to silently respond to the questions on the slide: “Do you know of anyone who is lactose intolerant? If so, what is their experience with lactose intolerance?”

Once all students have completed their responses, have them turn to a partner and discuss the story and their answers together. After a few minutes of discussion, move to **slide 11** and have students respond to the Mentimeter about their genetic mutations traits.

Once all students have responded, share the class results aloud. Then, display **slide 12** and have students take out a sheet of paper and select two seven colored pencils or markers. After students have completed their bar graphs, facilitate a brief class discussion using the question provided on the slide.

Teacher's Note: Creating the Bar Graph

If you don’t have colored pencils or markers, you could have your students use different shading techniques such as diagonal lines or color in some of the bars and leave others blank.

15 minutes

Explain

Teacher's Note: Video

The “What Is a Gene?” video consists of a longer explanation about the role of genetic mutations in the development of species. This lesson is written with the intention of stopping the video at the 2:30 mark. However, you should review the full video prior to facilitating the lesson. Depending on your specific class needs, you may want to include the entire video.

Display **slide 13**, and play the “What Is a Gene?” video.

Embedded video

https://youtube.com/watch?v=5MQdXjRPHmQ

After the video, pass out the **Gene Mutations Note-catcher**. Have students follow along in their notes as you review the information on **slides 14–20.**

60 minutes

Extend

Divide students into groups of three and pass out the attached **Mutations Presentation Instructions and Checklist** and **Presentation Rubric**. Move to **slide 21** and inform students that they will work with their group to create a slide presentation for a mutation. Assign one mutation from the **Types of Mutations List** to each group, either by random draw or by assigning one mutation to each group.

Review the instructions, checklist, and rubric as needed, emphasizing that each group member is responsible for presenting a portion of the slide content. If you plan to establish or review presentation norms, do so at this time. After expectations are clear, allow groups time to research and develop their presentations. Depending on classroom needs and available time, this work may take two to three class periods.

On the day of presentations, begin by reminding students of the presentation norms. These norms are outlined on **slide 22**, or you may replace them with your own classroom expectations.

10 minutes

Evaluate

Display **slide 23** and pass out the **Fiction in the Facts** half-sheet handout. Give students a few minutes to write two true statements and one false statement about mutations. If time allows, ask for a few volunteers to share out all three of their statements and allow the class to guess which is the false statement.

Optional Activity: Fiction in the Facts Competition

Collect each student's Fiction in the Facts half sheet before starting. Divide the class to create two teams. Have one player from each team come to the front of the room and give each a buzzer.

Explain that you will read all three statements aloud, and players must wait until you have finished before pressing their buzzer. The first player to buzz in gets to guess which statement was false. If that player guesses incorrectly, the other player will hear the options again and then have a chance to answer.

The player who guesses correctly earns one point for their team. If neither player is correct, no points are awarded. After each round, send the players back to their teams and invite new players to the front. Continue the game with a new set of statements until all students have participated or time runs out.

Resources

- Frazier, G. H. (2019). Defusing a Ticking Time Bomb: The Complicated Considerations Underlying Compulsory Human Genetic Editing. *Hastings Sci. & Tech. LJ*, *10*, 39. Available at: https://repository.uclawsf.edu/hastings_science_technology_law_journal/vol10/iss1/3
- Inside Edition. (2023, January 16). *Uncombable Hair Syndrome and Other Rare Genetic Conditions*. YouTube. https://www.youtube.com/watch?v=teoDWJPMHKM
- K20 Center. (n.d.). Driving question board. Strategies. https://learn.k20center.ou.edu/strategy/1511
- K20 Center. (n.d.). Fiction in the Facts. Strategies. https://learn.k20center.ou.edu/strategy/60
- K20 Center. (n.d.). Mentimeter. Tech Tools. https://learn.k20center.ou.edu/tech-tool/645
- Stated Clearly. (2012). What is a gene? [YouTube Video]. In *YouTube*. https://www.youtube.com/watch?v=5MQdXjRPHmQ