

# DNA, Genes, Chromosomes, and Alleles

## 5E Lesson

The 5E model is a scientifically proven method to improve student engagement and learning in your classroom

- ✓ Engagement
- ✓ Exploration
- ✓ Explanation
- ✓ Elaborate
- ✓ Evaluate



# Complete Teacher Instructions

## DNA, Genes, Chromosomes, and Alleles 5E Lesson

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |         |
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| Grades 7-10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DNA, Genes, Chromosomes, and Alleles | Ongoing |
| <b>Lesson Objective:</b><br>Students will learn about: <ul style="list-style-type: none"> <li>• Mendel</li> <li>• Laws of Inheritance</li> <li>• DNA</li> <li>• Genes</li> <li>• Chromosomes</li> <li>• Alleles</li> <li>• Gene patenting</li> <li>• Genomes</li> <li>• Traits</li> <li>• Nettie Stevens</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                      |         |
| <b>Possible Student Misconceptions:</b> <ul style="list-style-type: none"> <li>• Genes are traits</li> <li>• One gene = one trait</li> <li>• There are only two alleles per gene</li> <li>• Amino acids are the subunits that make up DNA</li> <li>• Only animals have DNA</li> <li>• Each DNA molecule is made of more than one chromosome</li> <li>• Each chromosome is made of more than one DNA molecule</li> <li>• Chromosomes do not contain genetic/hereditary information</li> <li>• DNA is made of two or three types of nucleotides</li> <li>• Genes are sequences of amino acids</li> </ul>                                                                                                                                                                                  |                                      |         |
| <b>Materials:</b> <ul style="list-style-type: none"> <li>• 1 device (smartphone, Chromebook, laptop, tablet, or computer)</li> <li>• A means of projecting a PowerPoint presentation</li> <li>• Internet access</li> <li>• General classroom objects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                      |         |
| <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>➢ All videos can be accessed directly from the PowerPoint. To retrieve icon while in slideshow mode and it will automatically open for you reason, right-click on the image and click Edit Hyperlink or some</li> <li>➢ I've created a video walkthrough if needed. It can be accessed here <a href="https://youtu.be/oCIKIP9SaDQ">https://youtu.be/oCIKIP9SaDQ</a></li> <li>➢ I don't believe in long lessons. If you feel your students are losing Stop the PowerPoint and give them a 5-minute break. If you'd like recommend my video collection here - <a href="http://www.teachwithfergy.com">http://www.teachwithfergy.com</a>. There are tons of brain-break videos to choose from all grouped together</li> </ul> |                                      |         |

## DNA, Genes, Chromosomes, and Alleles – 5E Lesson

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| <b>Engagement Phase</b><br>Your students will watch the video 'Mendelian Inheritance' and complete the questions found in the file – <a href="#">Engagement – Mendelian Inheritance</a> .<br><br>The video can be found here - <a href="https://www.youtube.com/watch?v=UyoOnemiZ7o&amp;t=206s">https://www.youtube.com/watch?v=UyoOnemiZ7o&amp;t=206s</a><br><br><b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>- The video is about five minutes long, but you will stop it at 2:47.</li> <li>- You may need to pause a few times so students can write down their answers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Duration: 20 min<br><br>Teacher Role – Learning and understanding<br><br><input type="checkbox"/> Connect to experience<br><input type="checkbox"/> Create interest<br><input type="checkbox"/> Ask questions<br><input type="checkbox"/> Understand objectives                                                               |
| <b>Exploration Phase</b><br><b>Exploration – Lab Station Activity</b> <ul style="list-style-type: none"> <li>• In groups of 2-3, have your students complete <a href="#">Exploration – Lab Station Activity</a>. Once they're done, they will submit their passport to you.</li> </ul> <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>• The complete instructions for my Lab Station activity can be found in the <a href="#">START HERE – Instructions</a> file.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Duration: 1 hour<br><br>Teacher Role – Learning and understanding<br><br><input type="checkbox"/> Students experience<br><input type="checkbox"/> Students develop skills<br><input type="checkbox"/> Students observe results, and connect                                                                                   |
| <b>Explanation Phase</b><br><b>PowerPoint Lesson</b> <ul style="list-style-type: none"> <li>• The lesson is found in the folder – <a href="#">Explanation – Lesson</a></li> <li>• This lesson is designed to be completed over one day</li> <li>• There are multiple embedded videos and plenty of opportunity to engage, interact and check for your students' understanding throughout the lesson</li> <li>• The lesson covers the following topics:               <ul style="list-style-type: none"> <li>➢ Mendel</li> <li>➢ Laws of Inheritance</li> <li>➢ DNA</li> <li>➢ Genes</li> <li>➢ Chromosomes</li> <li>➢ Alleles</li> </ul> </li> </ul> <b>Teacher Notes:</b> <ul style="list-style-type: none"> <li>• All videos can be accessed directly from the PowerPoint. To retrieve them, click on the video icon while in slideshow mode and it will automatically open for you. If they don't open, right-click the image and select Edit Hyperlink or something similar.</li> <li>• I've created a video walkthrough if needed. It can be accessed here - <a href="https://youtu.be/oCIKIP9SaDQ">https://youtu.be/oCIKIP9SaDQ</a></li> </ul> | Duration: 1 hour<br><br>Teacher Role – Concepts by material four presentation<br><br><input type="checkbox"/> Students understand content<br><input type="checkbox"/> Observations experienced discussed<br><input type="checkbox"/> Students vocabulary<br><input type="checkbox"/> Students connect to presented experience |

- I have also enclosed a .PDF version of both the teacher and student versions.
- I have created two versions of the lesson: one for upper middle school to high school students, and a simpler version for middle schoolers or older students with lower developed learning levels. Choose the version you think best fits your students.

### Elaborate Phase

#### Elaborate – Scavenger Hunt

Your students will complete – [Elaborate – Scavenger Hunt](#). This activity will require your students to move beyond what was covered directly in the lesson and allow them to further develop their understanding.

#### Teacher Notes:

- Students will work individually or in small groups
- Students will need one device per group

Duration: 1 hour

Teacher Role – Facilitate learning and keep students focused

#### Goal

- ☐ Students use their newly obtained knowledge to propose solutions and extend their learning to new situations

### Evaluate Phase

#### Quiz

Have your students complete - [Evaluate – DNA, Genes, Chromosomes, and Alleles Quiz](#)

#### Teacher Notes:

- It's sometimes best to have the students peer evaluate
- Placing students in small groups and having them exchange papers to mark will accomplish two things
- 1) Provide immediate feedback on the questions they just completed
- 2) Significantly reduce your marking time
- Peer evaluation is not needed, only suggested when appropriate

Duration: 30 min

Teacher Role – Distribute and collect evaluation

#### Goal

- ☐ Students are given the opportunity to demonstrate their understanding and evaluate their own progress

# Each phase is clearly described

# A Complete Lesson

## Gregor Mendel Hypothesized That ...

The inheritance of traits is due to discrete inheritance units

- What we know today as genes
- Inheritance: units are passed from parents to offspring



Make sure your students are on track

Student copies with blanks  
Videos embedded right into your slideshow

## Gregor Mendel Hypothesized That ...

The inheritance of traits is due to discrete inheritance units

- What we know today as genes
- \_\_\_\_\_



## Genes

- Basic unit of heredity
- Sections of DNA
- Genes are passed down from parents to offspring
- Code for traits
  - E.g. eye color, seed color, height, etc.



# Interactive and Engaging Activities

## Device-Based Scavenger Hunt DNA, Genes, Chromosomes, and Alleles



Includes

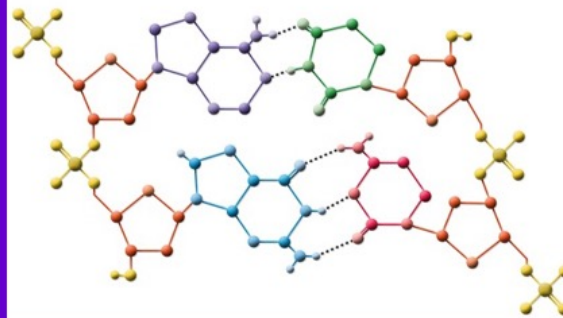
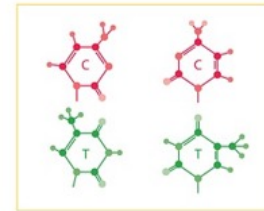
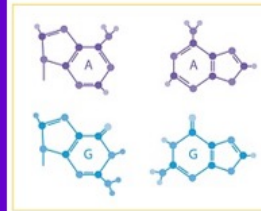
- 5 Unique Locations
- Online form submission
- Answer Key

Works on all smartphones, tablets, Chromebooks, and laptops

- **100% Digital**
- Simulations
- Quizzes
- Videos
- Games
- and more



## DNA, Genes, Chromosomes, and Alleles



7 Lab Station Activities to get your kids out of their seats and engaged in their learning

# Get away from tired practices and unengaged students



# Provide a Scientifically-Proven means of instruction



# Incorporate Technology and Increase Collaboration

