

## Science Cycle 3 : Identity

### GUIDING QUESTIONS:

- 1: What is DNA? (8.LS.6)
- 2: How can you predict which characteristics will be passed from parents to offspring? (8.LS.2. 8.LS.4)
- 3: How does the environment select for traits that will increase the likelihood of reproduction and survival of the individuals with those traits? (8.LS.5, 8.LS.9)
- 4: How can we re-create Mendel's pea experiment? (8.LS.10)



### GROUP WORK

#### Guiding Question 1: What is DNA? (8.LS.6)

\_\_\_\_ 1. Key Lessons:

- DNA structure, function, mitosis and meiosis (HS students share shelf work)

\_\_\_\_ 2. DNA lesson (PPT)

\_\_\_\_ 3. Meiosis lesson (PPT)

\_\_\_\_ 4. Mitosis lesson (PPT)

★ \_\_\_\_ 5. Extracting DNA from Cheek Cell

✓ \_\_\_\_ 6. DNA fingerprint webquest

✓ \_\_\_\_ 7. Meiosis and Mitosis Flip Books

✓ \_\_\_\_ 8. PBS DNA workshop- <http://www.pbs.org/wgbh/asotryit/dna/#> Click on DNA Workshop Activity. Explore DNA Replication and Protein Synthesis. Create a visual for the hallway display.

✓ \_\_\_\_ 9. Tour of DNA webquest

✓ \_\_\_\_ \* **REFLECT:** Think about the new information you've discovered about DNA. What's one thing you will take away from these lessons?

#### Guiding Question 2: How can you predict which traits will be passed from parents to offspring? (8.LS.2. 8.LS.4)

\_\_\_\_ 10. Key Lessons:

- Heredity, Punnett Squares

\_\_\_\_ 11. Heredity lesson (PPT)

\_\_\_\_ 12. Baby Pierre Mystery

★ \_\_\_\_ 13. Bean Genes Lab

\_\_\_\_ 14. Bikini Bottom Genetics Practice 1 and 2

\_\_\_\_ 15. Find a Gene Puzzle

✓ \_\_\_\_ 16. Huntington's Disease Case Study and Socratic Seminar

✓ \_\_\_\_ 17. Who Am I? Discovering your heredity in conjunction with Humanities and the ACPL

✓ \_\_\_\_ \* **REFLECT:** Who am I?

X Connection   X Silence & solitude   X Meaning & purpose   X Joy   X Creativity   X Transcendence   X Initiation

Key: ★ = Turn in   ✓ = Get checked

**Guiding Question 3: How does the environment select for traits that will increase the likelihood of reproduction and survival of the individuals with those traits? (8.LS.5, 8.LS.9)**\_\_\_\_ 18. Key Lessons:

- Survival of the Fittest, Asexual and Sexual Reproduction

\_\_\_\_ 19. You will find and understand an article on "Ethics in Genetics". Answer question along with the article and participate in class discussion

✓ \_\_\_\_ 20. Read case study on "Prenatal Genetic Counseling" (scenario #3). Answer questions and discuss with class.

★ \_\_\_\_ 21. TIC-TAC-TOE Sexual and Asexual Reproduction activity

✓ \_\_\_\_ 22. Genetics smile activity (Gen\_smilewks1)

\_\_\_\_ 23. Assessment

✓ \_\_\_\_ \* **REFLECT:** Have you become more aware of the ways your body has so much to get right and how often it does get it right? What about genetics has surprised you the most?**Guiding Question 4:****Culminating Project: Replication of Mendel's pea experiment. (8.LS.10)**

Mendel worked with seven characteristics of pea plants: plant height, pod shape and color, seed shape and color, and flower position and color. Your group will choose of the characteristics Mendel worked with to research and replicate. You will share your triumphs, failures, outcomes and overall learning from the experience. Here are some of the details:

- Groups will choose one of the seven characteristics (each group will have a unique characteristic, no repeats)
- Groups will research, grow, cross, and re-grow their peas
- Groups will create an observation log and record all details of their experiment (procedures will need to be shared before the experiment can begin). **THIS IS A REALLY IMPORTANT STEP!**
- Groups will also research the history of how humans have and do alter organisms genetically (specifically plants here)
- Groups will share their learning through pictures of the process, creation of graphs, reflection of their experiment, and the formation of a creative piece of work that can be shared with others.



## INDIVIDUAL WORK

\_\_\_\_ 1. **Vocabulary words:** You will each get a word(s) to research and contribute to the class list. Have your group teacher approve your definition and then add it to the class list. There will be an authentic assessment required. **MANY OF THESE WORDS WILL REQUIRE A SCIENCE TEXT, RATHER THAN A DICTIONARY. Please record your sources per definition.**

- |                          |                               |                       |
|--------------------------|-------------------------------|-----------------------|
| ❖ Alleles                | ❖ Incomplete dominance        | ❖ Sexual reproduction |
| ❖ Dominant               | ❖ Monohybrid                  | ❖ Trait               |
| ❖ Recessive              | ❖ Dihybrid                    | ❖ Purebred            |
| ❖ Genotype               | ❖ Mendel's Law of Segregation | ❖ Co-dominance        |
| ❖ Phenotype              | ❖ Heredity                    | ❖ DNA                 |
| ❖ Heterozygous           | ❖ Mutation                    | ❖ RNA                 |
| ❖ Homozygous             | ❖ Haploid                     | ❖ Gamete              |
| ❖ Homologous chromosomes | ❖ Diploid                     | ❖ Fertilization       |
| ❖ Chromosome             | ❖ Mitosis                     | ❖ Gene                |
| ❖ Punnett square         | ❖ Meiosis                     | ❖ Genetic code        |
| ❖ Hybrid                 | ❖ Asexual reproduction        | ❖ Daughter cell       |
| ❖ Complete dominance     |                               | ❖ X-chromosome        |
|                          |                               | ❖ Y-chromosome        |

\_\_\_\_ 2. **Choice Projects:** Choose three (7<sup>th</sup>) & four (8<sup>th</sup>) topics to explore from different GQs. **1 page (7<sup>th</sup>) & 2 pages (8<sup>th</sup>) of handwritten notes and a high quality, meaningful product** are required for your work to be ready for a teacher conference. Please be sure to properly site all sources in your notes. Source starters are provided. You need a total of 3 sources. Please vary your product types.

### Guiding Question 1: *What is DNA? (8.LS.6)*

- Gregor Mendel-- <http://www.biography.com/people/gregor-mendel-39282>
- Forensics-- <http://www.crimesceneinvestigatoredu.org/what-is-forensic-science/>
- DNA Repair-- <http://www.ncbi.nlm.nih.gov/books/NBK9900/>
- Polymerase Chain Reaction-- <http://www.shmoop.com/dna/pcr-polymerase-chain-reaction.html>
- Common Mistakes-- <http://www.shmoop.com/dna/common-mistakes.html>
- The Genetic Code-- <http://www.shmoop.com/dna/genetic-code.html>

### Guiding Question 2: *How can you predict which traits will be passed from parents to offspring? (8.LS.2. 8.LS.4)*

- Down Syndrome <https://ghr.nlm.nih.gov/condition/down-syndrome>
- Fragile X Syndrome <https://ghr.nlm.nih.gov/condition/fragile-x-syndrome>
- Animals Helping Humans Treat Genetic Disorders-- <http://medicalobserverph.com/goat-to-be-cloned-to-treat-rare-genetic-disorder/>
- Gaucher Disease-- <http://www.genome.gov/25521505>
- Noonan Disease-- <http://www.genome.gov/25521674>
- Careers in Genetics-- <http://www.wisegeek.com/what-are-the-different-genetics-careers.htm#didyouknowout>

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**Guiding Question 3: How does the environment select for traits that will increase the likelihood of reproduction and survival of the individuals with those traits? (8.LS.5, 8.LS.9)**

- a) How does the woodpecker avoid a headache?  
[http://www.pbs.org/wgbh/evolution/library/01/1/image\\_pop/l\\_011\\_04.html](http://www.pbs.org/wgbh/evolution/library/01/1/image_pop/l_011_04.html)
- b) Mimicry-- [http://www.pbs.org/wgbh/evolution/library/01/1/l\\_011\\_02.html](http://www.pbs.org/wgbh/evolution/library/01/1/l_011_02.html)
- c) Selection Pressures in Plants--  
[http://www.pbs.org/wgbh/evolution/library/01/2/l\\_012\\_01.html](http://www.pbs.org/wgbh/evolution/library/01/2/l_012_01.html)
- d) Founder Effect-- [http://evolution.berkeley.edu/evolibrary/article/bottlenecks\\_01](http://evolution.berkeley.edu/evolibrary/article/bottlenecks_01)
- e) Coloration in Animals-- <http://www.biologyreference.com/Ma-Mo/Mimicry-Camouflage-and-Warning-Coloration.html>
- f) Evolution of the Eye-- [http://www.pbs.org/wgbh/evolution/library/01/1/l\\_011\\_01.html](http://www.pbs.org/wgbh/evolution/library/01/1/l_011_01.html)
- g) How are organisms arranged into taxonomic levels?  
<https://www.learner.org/courses/essential/life/session2/closer4.html>
- h) What's in a name? What do organisms' scientific names tell you about them?  
[http://animaldiversity.org/animal\\_names/scientific\\_name/](http://animaldiversity.org/animal_names/scientific_name/)

**Guiding Question 4: Culminating Project: Replication of Mendel's pea experiment. (8.LS.10)**

- a) Who was Gregor Mendel? Find out more about the man behind the peas.  
<https://www.biography.com/people/gregor-mendel-39282>
- b) Law of segregation <https://www.khanacademy.org/science/biology/classical-genetics/mendelian--genetics/a/the-law-of-segregation>
- c) Law of independent assortment  
<https://www.khanacademy.org/science/biology/classical-genetics/mendelian--genetics/a/the-law-of-independent-assortment>
- d) How have humans altered organisms genetically?  
<https://www.britannica.com/science/genetically-modified-organism>
- e) How do viruses and bacteria affect the human body? How do they change?  
<https://science.howstuffworks.com/life/cellular-microscopic/virus-danger.htm>
- f) Replication of an experiment...how do you accomplish this and why?  
<https://science.howstuffworks.com/life/cellular-microscopic/virus-danger.htm>
- g) What's the big deal about GMO's? Find out what GMO's are and research both sides of the argument (for and against GMO's). <https://www.healthline.com/health/gmos-pros-and-cons#labeling>

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Footnote 1: [http://www.ucsusa.org/clean\\_energy/our-energy-choices/a-short-history-of-energy.html#.Vk-LqXarTIU](http://www.ucsusa.org/clean_energy/our-energy-choices/a-short-history-of-energy.html#.Vk-LqXarTIU)

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