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| **Lesson Title**: **Science Skills-Heredity****Created by:** Mary Clare Sullivan | **Level of Lesson: NRS 4** |
| **Intended Modality:** (check all that apply)X□ In-person X□ Virtual X □ Hybrid  |
| **Content Area(s)** | **Targeted** [**IL ABE/ASE Content Standards**](http://www.excellenceinadulted.com/resources/abease-curriculum-project/) |
| Reading in the Content Area:Science & TechnicalReading-Vocabulary | 4.R.RS.3 4.R.RS.4 4.R.RS.7 4.R.RS.8 4.R.RS.11 4.R.RS.124.R.VA.1 4.R.VA.4 |
| Speaking & Listening | 4.S.CC.1 4.A.PK.1 |
| Functional & Workplace Skills | 4.R.FW.2 |
| Math | 4.RP.1  |
| **Integrated** [**Essential Employability Skills**](https://www.illinoisworknet.com/DownloadPrint/ILEssentialEmployabilitySkills-Handout.pdf) |
| X□ Personal Ethic *(Integrity, Respect, Perseverance, Positive Attitude)*1a, 1b demonstrates appropriate use of technology | X□ Teamwork *(Critical Thinking, Effective & Cooperative Work)*4.a, 4.b Critical Thinking & Whole class/partner/independent activities |
| X□ Work Ethic *(Dependability, Professionalism)*2.a.i Dependability-fulfills obligations | X□ Communication *(Active Listening, Clear Communication)*3a, 3b |
| **Lesson Objectives *(Students will be able to)****:* * Students will read and comprehend informational texts at their appropriate level of complexity.
* Students will understand and use technology and demonstrate an understanding of the features of a computer and network interfaces and use them efficiently, without assistance.
* Students will explore a variety of technology resources to complete learning tasks.
* Students will demonstrate a command of the conventions of Standard English grammar and usage when writing and speaking.
* Students will engage effectively in discussions and be able to recount main ideas and supporting details of a text.
* Students will be able to define allele & explain the difference between dominant & recessive alleles and give an example
* Students will be able to distinguish between genotypes & phenotypes
* Students will be able to describe why children are neither genetically nor phenotypically identical to their parents
* Students will be able to create a Punnett Square and predict traits passed from parents to children
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| **Engagement is not “one size fits all.” How are you providing multiple ways to engage all learners? Click on** [**Multiple Means of Engagement**](https://udlguidelines.cast.org/engagement) **to learn more about providing options for learners and explain how you are including this below:****7.1*** Students choose various online resources to research information
* Students create chromosomes for their baby in the Mix & Match Activity

**7.2*** Students discuss their inherited traits from their parents and grandparents, which are personal contextualized to each of their lives
* Activities involve active participation, exploration, and experimentation
* Activities are culturally & socially relevant, as they reflect students’ ethnic/cultural, racial and/or gender group

**7.3*** Students are encouraged to work individually, with a partner, and to participate in whole group discussions throughout the lesson
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| **Key Vocabulary**: AlleleChromosomesDNADominant GenotypeHeterozygousHomozygousInheritMeiosisMitosisPhenotypeProbabilityRecessive Trait |

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| **Instructional Materials:** [**Google Drive-Materials Link**](https://drive.google.com/drive/folders/1tAF6dMrGKAgWy3syk-i8NK7uPD5xOxmk?usp=sharing)Textbooks, online curriculum, materials: * Computer with Internet access or cell phone
* Pencils, pens, notebooks, folders, prior handouts
* Heredity Mix & Match Instructions
* Any Matches? Worksheet
* Genotype & Phenotype Worksheet
* Ratio Review
* Punnett Square Worksheet
* 8 Tips to Google Like a Pro
* Paper lunch bags
* Construction Paper
* Toothpicks
* Jellybeans

Websites: * Genotype vs. Phenotype-Genetics: <https://www.youtube.com/watch?v=NLVulUy7T7E>
* What is an allele? <https://www.youtube.com/watch?v=rdJzAbRMC2o>
* Epigenetics: <https://www.youtube.com/watch?v=kp1bZEUgqVI>
* Punnett Squares: <https://www.britannica.com/video/189080/video-traits-Punnett-square-Gregor-Mendel-way>
* Quizlet- Unit 1 Life Science Vocabulary: <https://quizlet.com/77712609/ged-science-unit-1-life-science-flash-cards/>
* Introduction to Ratios: <https://www.youtube.com/watch?v=xA435umOQuw>

Teacher Resources:* Human Genetics: <https://www.teachengineering.org/lessons/view/duk_genetics_mary_less>
* Heredity Mix & Match Activity: <https://www.teachengineering.org/activities/view/duk_genetics_mary_act>
* Don’t be a Square: <https://www.teachengineering.org/lessons/view/uoh_hp_lesson_square>
* <http://www.adoptionpolicy.org/Adoption_Awareness_Schools.pdf>
* <http://www.ifapa.org/pdf_docs/adoptionbasicsforeducators.pdf>
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| **Lesson Activities:** [**Google Drive-Materials Link**](https://drive.google.com/drive/folders/1tAF6dMrGKAgWy3syk-i8NK7uPD5xOxmk?usp=sharing)* Discuss prior lesson regarding cells/structure/division
* Review vocabulary in Quizlet <https://quizlet.com/77712609/ged-science-unit-1-life-science-flash-cards/>

While modeling on overhead, instructor will ask students to access Unit 1: Life Science Vocabulary in Quizlet App on their cell phones or on computers and read or listen the vocabulary words listed in “Key vocabulary”. Students will record definitions on blank vocabulary log, drawing a symbol/diagram to help them with retention. They may also translate the definition into their native language to promote understanding.* Instructor will provide overview of Heredity activity and discuss students’ familiarity with basic human genetics
* Video: Genotype vs. Phenotype <https://www.youtube.com/watch?v=NLVulUy7T7E>
* Attention getter: Ask “Where do babies come from?”
	+ Students will brainstorm and list knowledge on the board with instructor guidance and modeling
	+ Video: Epigenetics <https://www.youtube.com/watch?v=kp1bZEUgqVI>

Ask: "Have you ever told someone that they look like their mom or dad or another family member?"* + Rather than focus a genetic lesson on a student’s relationship to his parents and siblings, ask students to choose any biologically related group – other family members, friends, neighbors – to investigate inherited traits.
	+ Students will discuss the specific traits they observed in others, such as hair color, eye color, ability to roll tongue, etc.
	+ Video: What is an allele? <https://www.youtube.com/watch?v=rdJzAbRMC2o>
	+ Instructor will summarize human sexual reproduction and specifically how alleles can be passed to offspring by modeling the alleles of two hypothetical parents and determining the possible outcomes by creating/completing Punnett Squares on the board or overhead
* Whole class activity: Complete the “Genotype-Phenotype Worksheet”

Because this text in this worksheet is at a higher level, the instructor should walk students through the activity step-by-step to ensure understanding of the directions and model the results/answers on the board with input from students.* Heredity Mix & Match Activity (**optional**- may expand & extend lesson with this small group activity: 1 hour) <https://www.teachengineering.org/activities/view/duk_genetics_mary_act>
	+ Pair students and explain Heredity Mix & Match Instructions to complete activity, follow the steps in the link provided. Instructor should model the steps and the small groups complete the tasks at the same time. Directions may be revised for simplicity.
	+ Students will then complete “Any Matches? Questions Handout” followed by a whole class discussion of results.
* Define and provide background about Punnett Squares and model examples on the board using input from the students.
* Review ratios using the Ratio Review worksheet and Video: Introduction to Ratios: <https://www.youtube.com/watch?v=xA435umOQuw>
* Video: Punnett Squares:<https://www.britannica.com/video/189080/video-traits-Punnett-square-Gregor-Mendel-way>
* Discuss the reasons why the study and understanding of genetics is important. Ask students to think of industries and fields of study where genetics plays an important role. Students may research on the Internet who would want/need to understand genetics. Instructor will model Google search procedures using “8 Tips to Google Like a Pro”
* Explain homework assignment and model an example on the board: Punnett Square Worksheet
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| **Learners vary in the way that they react to and grasp information that is presented to them. Click on** [**Multiple Means of Representation**](https://udlguidelines.cast.org/representation) **to explore ways that you can provide options for representing content and explain how you are including this below:** 1. **Flexible Content:**
* Written text
* Videos with close captioning
* Online search/websites
* Google Drive/Docs
1. **Language & Symbols**
* Vocabulary Log
* Multiple Media- illustrations, photos, videos, text
1. **Comprehension**
* Activate background knowledge: vocabulary review, prior biology lessons, ratios
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| **Performance Tasks:*** Heredity Mix & Match Activity
* Any Matches? Worksheet
* Genotype & Phenotype Worksheet
* Punnett Square Worksheet
* Students will determine the meaning of words and phrases as they are used in the text & videos and record in vocabulary log
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| **Learners best express what they know in different ways. Click on** [**Multiple Means of Action & Expression**](https://udlguidelines.cast.org/action-expression) **to explore ways to offer options for learners and explain how you are doing this below:** [**Google Drive – Materials**](https://drive.google.com/drive/folders/1tAF6dMrGKAgWy3syk-i8NK7uPD5xOxmk?usp=sharing)* Add captioning to YouTube videos
* Add captioning to Blackboard Collaborate Recordings
* Students may choose to listen to vocabulary pronunciations & definitions in Quizlet in addition to reading the material
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| **Notes: “**Schools today encompass increasingly diverse populations of students. In addition to a wide variety of ethnic, racial, and cultural backgrounds, students come from many types of family situations, including adoptive and foster families. Educators, understanding that family-based assignments can be challenging and painful for these students, can offer alternatives that are appropriate for all students.” This lesson should be taught with that in mind and revise activities to accommodate such situations. Note the wording in the “Attention Getter” on page 3.* Before each activity, instructor should model or give an example of the completed activity and provide a time frame for completion of each activity
* This lesson may be split up/chunked across multiple classes
* The “Mix & Match” activity is **optional** and takes about 60 minutes to complete in small groups followed by a whole-class discussion of results. Instructor should model the steps and the small groups should complete the tasks at the same time. Directions may be revised by instructor for simplicity.
* Students should have prior knowledge of ratios. Instructor may provide a brief review prior to the Punnett Square activity using the “Ratio Review” worksheet & Introduction to Ratios: <https://www.youtube.com/watch?v=xA435umOQuw>
* Low-tech classroom:
* Students may watch videos on cell phone with headphones
* Students may access online research websites on cell phone
* Students may review vocabulary using free Quizlet app on cell phone
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