Plant and Animal Genetics

Student Learning Targets:

- Students will articulate a brief history of the exploration of DNA, genetics and biotechnology.
- Students will identify and draw the different components that comprise the DNA structure.
- Students will identify how the genotype and environment influence an organism's phenotype.
- Students will identify heterozygous and homozygous traits.
- Students will demonstrate crosses using a Punnett square.
- Students will calculate the probability of a given genetic outcome using a Punnett square.

Supplies:

Quantity:	Item:
	Powerpoint
	Whiteboard
	Whiteboard Markers
	Canva Accounts
	Computer Access
	Tweets: by Watson, Crick and Mendel Assignment Description (1 per student)
	Punnett Square Palooza Assignment (1 per student)
	Sample Infographic

Overview:

- Introduction and Anticipatory Set
  - What We Know Chalk Talk
- Teaching and Main Activities
  - Presentation of Core Material
  - PowerPoint Presentation
  - Discussions Embedded Throughout
  - Watson, Crick and Mendel Twitter Profiles
  - Punnett Square Palooza
- Wrap Up
  - Canva Creation

Introduction and Anticipatory Set:

- What We Know Chalk Talk
  - Context and Description
    - On the white board, write the starter question "What is genetics?"
    - Instruct students to use whiteboard markers to respond to the question with answers, ideas, etc.
    - Students should branch off from one another, underlining or starring key phrases or terms they agree with, asking follow up questions, etc.
    - Wrap-up with a brief discussion using some of the questions included below.

- Assessment or Questions
  - What are genetics?
  - What are some things we learned about genetics through this activity?
  - What do you want to learn about plant and animal genetics?
  - How do genetics connect to agriculture, food and the environment?
- Assessment or Questions
  - This is meant to be a silent activity. Students should only communicate through their writing on the board.
  - Play some upbeat music in the background, just make sure it is only instrumental and contains no words.

Teaching and Main Activities:

» Presentation of Course Material

- Student Learning Targets
  - Students will articulate a brief history of the exploration of DNA, genetics and biotechnology.
  - Students will identify and draw the different components that comprise the DNA structure.
  - Students will identify how the genotype and environment influence an organism's phenotype.
  - Students will identify heterozygous and homozygous traits.
  - Students will demonstrate crosses using a Punnett square.
  - Students will calculate the probability of a given genetic outcome using a Punnett square.
- Context and Description
  - Share the material found in this presentation.
- Assessment or Questions
  - Informal Discussions
  - There are some prompts and probes throughout the presentation for students to respond to individually or as a large group.
- Tips and Tricks
  - Math Problems: Give students the opportunity to work on any problems and math-related questions individually or in small groups, but be sure to go over all Punnett square examples as a class.
  - Human Examples: Relate the idea of genetics back to humans whenever possible (eye color, hair color, the expression of certain diseases, etc. are all examples of genes that are passed down (heritable) in humans).
  - Phenotype Example: To better illustrate a phenotype, you could bring in a really dead plant and a healthy plant (that are the same variety or species—same genotype) to show that the environment plays a role in determining how the plant looks (the phenotype)

» Presentation of Course Material
- Student Learning Targets
  - Students will articulate a brief history of the exploration of DNA, genetics and biotechnology.
- Context and Description
  - Randomly divide the students into three groups. Each group is assigned to focus on Watson, Crick or Mendel for the activity.
  - Students work in pairs or individually using the provided Canva template to create a twitter profile for Watson, Crick or Mendel.
  - Using the assignment description as a guide, have students import images, text and graphics that resemble the research and interests of their assigned scientist.
  - Have each twitter profile turned-in via a .jpg or a .pdf via email and have students share highlights with the class.
- Assessment or Questions
  - Discussion Questions
    - What were some of the common themes between the scientists and their research?
    - How have these scientists impacted modern society and the agriculture industry?
- Tips and Tricks
  - Ensure students select the “Use as Template” option when creating their Canva designs.
  - Help students while using Canva and direct them to tutorials on the website as needed.

» Punnet Square Paloozea
- Student Learning Targets
  - Students will identify heterozygous and homozygous traits.
  - Students will demonstrate crosses using a Punnett square.
  - Students will calculate the probability of a given genetic outcome using a Punnett square.
- Context and Description
  - Cut up the Punnett Square Palooza Letters in advance.
  - Have students randomly select letters (divide them out amongst the class)—try to ensure students receive a variety of letters.
  - Set out the various crosses around the room.
  - Students work together to match letters and form Punnett squares from the crosses around the room. The student who gets rid of their letters the first wins!

- The master sheet lists all of the crosses in the activity.
- Print out copies of the crosses so students can match their letters to the appropriate crosses.
  - Alternatively, you could print out blank crosses (without any letters) and have students work together as a class to use all of the letters they have if you have a lot of time available for the activity. This will be very challenging, however!
  - Another alternative could be having students be assigned a cross. Then tell them if it is homozygous, heterozygous, etc. and have them determine the letters on their own.
  - Students can also report out using a tweet or an Instagram post to capture key ideas in a succinct manner.

- Assessment or Questions
  - Have students find one of the cross sheets and calculate the outcome.
    - Then, encourage students to come up with a scenario for their cross (ex: for AA x Aa one parent is homozygous dominant for thick fur and is a carrier (heterozygous) for the thin fur. There is a 50% chance of the offspring having thick fur (AA) and 50% chance of being a carrier (Aa)).
  - Have students find one of the cross sheets and calculate the outcome.
    - Answer: Codominance (two different alleles such as AB blood).
  - Tips and Tricks
    - Play some fun music in the background to engage students and get them moving.

Wrap Up:

» Canva Creation

- Context and Description
  - Students will use Canva accounts to create an infographic about plant or animal genetics.
- Assessment or Questions
  - When students have finished, be sure to have them engage in a peer review with one another.
  - Have each student print their infographic or display on computers and complete a gallery walk.
    - Ask students to evaluate some of their classmates' designs on the basis of color, space and size, as discussed in class.
    - You can have students write feedback on post-it notes and stick on the students' keyboard or beneath the poster itself.

- Tips and Tricks
  - Be prepared to assist students with using the Canva website. There are a variety of tutorials and video clips that can be accessed when getting started with Canva that will provide you with assistance.