



Epigenetics and Healthy Life Choices

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This curriculum unit is recommended for:
Middle Grades Math

Keywords: DNA, Cells, Chromosomes, Traits, Adenine, Guanine, Cytosine, Thymine, Germ Cells, Heredity, Epigenetics, Phenotype, Genotype, Punnett Squares, Mutations, Environmental Factors, Epigenetics

Standards: See [Appendix 1](#) for teaching standards to be addressed.

Synopsis: This unit will focus on combining both mathematics and science concepts to study epigenetics. Throughout this unit students will learn about scientific concepts such as DNA, Heredity, Characteristics, Mutations, Epigenetics and Environmental impacts of genes. Students will also learn mathematical concepts such as statistics, probability, likelihoods, statistical inferences and correlations when looking at the scientific datasets. Students will also utilize equations and ratios and proportions. These concepts will be in the form of mini lessons and activities. The final project will require students to create awareness portfolios that will include their research, advertisements, letters to community leaders addressing concerns, a solutions guide and an awareness fair in which people can attend. Student will identify how environmental changes such as food can cause alterations of genetic information. This project will highlight associations of neighborhood characteristics with the locations of healthy markets, food, gyms and other facilities that promote health and wellness. Students will research “Food Deserts” and apply it to how it is currently having an impact in our community. This unit will allow students to learn about local food deserts and make associations such as access to healthy and affordable food, social disparities, impact on obesity and health risks. In addition, it will contain a community awareness campaign where students will address these challenges with the community along with community leaders.

I plan to teach this unit during this upcoming year to 50 students during enrichment.

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Introduction

Marie G Davis is a school that has encountered many changes since I've joined the school as a math teacher. When I first started working there the school was titled Military Global Leadership Academy at Marie G Davis K-12. The name was a little misleading to many in the community and was viewed as a military style bootcamp or a program that forced students to join the military. Our program at the time had a phenomenal JROTC program in which students could choose if they wanted to take that career route. The global leadership pieced focused on providing global awareness through our international curriculum units and events. Many in the community ignored the Global Leadership aspect of the name and it was very difficult to promote the program based on misconceptions and presumptions of our school.

In 2016, the program shifted once more and was renamed Marie G Davis K-8 school, transferring the secondary program into a traditional high school. In result, the JROTC program was no longer present and the school's focused on grade levels K-8. The name had shifted which changed the perception of our school and we continued to embed some components of the global learning concept. Students at our school were exposed to various opportunities to learn globally through their learning curriculums and research. We held International Festivals at our school that provided community awareness about cultural diversity. However, with the new modifications, that too was taken away. Since I have started working at Marie G Davis several years ago the International Festival and cultural community project was always a component from my school's mission that I strongly supported. It allowed the community to look beyond their personal backgrounds, beliefs and culture and become open minded and receptive to the individuality of others. It also created a sense of unity and empathy when identifying commonalities. I love the consistency of our school's ability to maintain the global leadership component of our school and value cultural diversity regardless of the many transformations of our program. However, I would love to bring back the sense of global awareness through a community based project or showcase.

School Background/Demographics

Our school is very diverse and made up of unique students who have a plethora of backgrounds and diverse cultures. The makeup of our school is majority African American and Latino students who come from various socioeconomic backgrounds. Many of my students have not been out of North Carolina let alone Charlotte while others have been out the country on several occasions. Even with the implementation of international studies within our lessons, it is sometimes hard for students to grasp the concept of global issues because they are fixated on what's going on locally. My hope is for students to understand that issues can be shared globally and that they can one day become innovators and collaborate to resolve global issues.

Academically our school is 50% proficient in English Language Arts, 45% proficient in Mathematics and 71% proficient in Science. My students are already labeled as not being college-ready and incapable of being successful with their futures. I want to provide academic enrichment that will raise the bar for my students and allow them to enhance their academic engagement and critical thinking skills. It is my desire to implement a curriculum that would allow me as an educator to think more critically about the structure of my math class and introduce new concepts. My unit goals are to encourage students to become global thinkers and problem solvers along with expose them to various concepts that will spark their interest and

prepare them for the future. After completing this unit my students receive exploratory lessons that they can apply to their community service and awareness (local and globally) project.

Curriculum/ Unit Goals

The goals of this unit is to implement the Common Core 7th grade mathematics and science standards listed in the standards section. I plan to collaborate with the science teacher to teach cross curriculum standards that will increase the growth of our students. This curriculum will take place during Academic Enrichment which is a 45 minute session that takes place daily. This class is designed for tutoring, project based learning, remediation. The unit will take about 3-4 weeks depending on the ability levels of students and schools pacing guide.

Background (Unit Goal Continued...)

My mathematics/enrichment class is designed for students to learn through research, hands on learning and independent thinking. During enrichment, I utilize that block to allow students to partake in project based learning. Each students has access to a chromebook device in which most of the information is housed. I have created a Google Classroom page in which students can access all information that pertains to class. Students have access to notes, announcements, lab information, projects, classroom discussions and links to valuable resources. Hands on activities are also housed on this platform through uploads of video and photo footage. Each quarter students are required to participate in a project in which I will utilize my CTI unit during Quarter 3. I chose this time based on conversations with their core science teacher. Their science teacher and I plan to collaborate together to ensure that we are reiterating our math and science standards with this unit.

Prerequisites

Prior to this unit, it will help if students already have prior knowledge of how to utilize frayer models, participate in discussion boards, gallery walks, stating claims and providing supportive details for reflections. It is not required and students may certainly learn as you do, however it may take up extra time. If students are familiar with some of these activities it will help activities run at a quicker rate. Overall, I believe the most important prerequisite for this unit or any lesson in general is to build a safe classroom climate in which students can collaborate, engage in open and respectful conversations and help one another. This unit requires a lot of collaboration and teamwork that students will be required to do.

Content Research

If you're a mathematics teacher it is great to research the following concepts to become familiar with science concepts that you'll need to discuss with your students. I plan to take these concepts and present to students via mini lessons. My mini lessons will consist of Powerpoint presentations, videos, independent student research and guided notes. Some of the students may have prior knowledge of concepts depending on the alignment with their science teacher. Some teachers will tag team this unit while others may use this as remediation of the concept.

DNA & Genes

“You must get that from your...” followed by the name of one of your family members is a common phrase used when discussing characteristics or traits. In fact, it is deoxyribonucleic acid better known as DNA that carries the genetic makeup of living organisms. DNA provides living organisms instructions on how to function, develop and reproduce using four chemical bases known as Adenine (A), Guanine (G), Cytosine (C) and Thymine (T) which pair together, creating base pairs. Adenine and Thymine are paired together while Guanine and Cytosine serve as the other couple. When paired together with sugar and phosphate, nucleotides are formed in two long strands that form a double helix. Human DNA consists of about 3 billion bases, and more than 99 percent of those bases are the same in all people (1). While teaching this concept to students, I would love for them to learn about the double helix and importance of matching the bases and create a DNA product as a part of the unit. My students are very creative and I am going to provide them with the specifics that need to be included on the model and let them create the model using any method.

Heredity & Chromosomes

After students have learned the foundation of DNA, I will then transition to the introduction of genes which will be a large component of our unit. Genes are made of DNA and inherited from parents to their offspring delegating characteristics. Humans have two copies of each gene in which they inherit from each parent. When there is a slight difference in the gene we call those genes alleles which creates variation. The [Human Genome Project](#) estimated that humans have between 20,000 and 25,000 genes (1). DNA contains chromosomes which are given to living organisms by their parents. There are two pairs of chromosomes in living organisms and 23 are received from each parent creating 46 total. One pair of the chromosomes determines the gender of a living organism. If the pair is XX then the offspring is female and if it is XY then it is a male. This portion of the lesson will initiate the conversation of what features, we received from our parents and/or grandparents. I will have students create a picture analysis in which they create a model that includes their picture along with their parents photo and they will include observations on which family member they believe they received certain characteristics and traits from.

Genotype & Phenotype

When looking at a living organism, the characteristic that we see, or physical attributes, are referred to as the phenotype. The genotype is the genes that the organism carries. The two go hand in hand. If there is a change in the genotype then it affects the appearance of the organism. One major component that can alter the genotype and phenotype of an organism is environmental factors. The most common environmental change is food. For example, some animals such as flamingos are colored based on what they digest. The food they eat either makes them more of a white color or pink.

Scientists have analyzed Punnett squares to calculate the probability of what an organism's phenotype will be. In 1905, Reginald Crundall Punnett, a mathematician, created this model long after Mendel's experiments (2). The 4 square model identifies the alleles of both parents and pairs the various combinations together. We can use the probability to predict the likelihood of a certain phenotype forming when mating plants or animals with different traits. Students will use this concept to tie in traits and heredity from science and probability from mathematics.

Genetic Mutations

After we have reviewed the basics of genetics, we will then have the discussion around variation and how genes can be altered and why some living organisms may have different traits than their parents. We will focus on gene mutations. We will briefly discuss hereditary mutations and discuss more in depth environmental mutations occur.

Hereditary mutations are also known as germline mutations because they are found in the parent's egg and sperm cell which are also called germ cell. When the two cells come together forming mutations it carries over into the offspring. Acquired mutations occur are mutations that change the living organisms in its present state. The changes can be a result from many environmental factors. For example, These changes can be caused by environmental factors such as ultraviolet radiation from the sun, or can occur if an error is made as DNA copies itself during cell division (1).

The bulk of our epigenetics project will focus on environmental factors resulting into DNA changes. Students will create an awareness project that describes the history of DNA and how environmental factors be result to mutations. Students will be expected to discuss the environmental factor, how it impacts mutations and the negative results it may create. After students have conducted their research, they will present the information at an awareness fair based on the given rubric. The environmental factor that we'll focus on is food/diet. Because my students are shifting into IB learners this school year, I will strongly encourage them to think critically and creativity for their project.

Epigenetics

The epigenome is made of all chemical compounds that have been attached to DNA to regulate gene activity within the genome. However, the chemical compounds are attached to DNA but not apart of it's sequence. Modifications occur when cells divide and can be inherited or Epigenetic modifications remain as cells divide and in some cases can be inherited or influenced by the environment such as pollutants, diets, etc.

Changes within epigenetics can determine whether genes are active or inactive. This affects the protein production in some cells. Methylation is a common type of epigenetic modification. This occurs when there are errors in the epigenetic process which can lead to genetic disorders such as metabolic and degenerative disorders and cancer. The errors occur when there is gene inactivity or abnormalities.

A common type of epigenetic modification is called methylation. Because errors in the epigenetic process, such as modifying the wrong gene or failing to add a compound to a gene, can lead to abnormal gene activity or inactivity, they can cause genetic disorders. Conditions including cancers, metabolic disorders, and degenerative disorders have all been found to be related to epigenetic errors.

Nutrition & Epigenetics

When understanding how environmental factors cause epigenetic change, scientists have found it easier to study and make connections with human diets. The alteration of gene expressions occur rapidly when diets consist of high methyl-donating nutrients. Metabolic pathways are manipulated into molecules from the nutrients being extracted from our food. Nutrients that are rich in methyl-making pathways are folic acid, B vitamins and SAM-e. In addition, the containers that our food is packaged in can also affect our health. Bisphenol A (BPA) is a compound used to make polycarbonate plastic typically water bottles and tin cans. (9) In result, some manufacturers have discontinued using these products. I would like for students to conduct some type of tracker in which they track the food that a person eats and determine if any of those items have methyl-donating nutrients or any other components that may shift the epigenome.

Nutrition & Early Development

As an offspring your mother's diet can affect your epigenome that follows you throughout your life. When there is a lack of methyl-donating folate or choline before or just after birth it can cause genomes to be under-methylated for life (2). This can also happen in adults, however if methyl is added back to the diet, it can be reversed.

Food Deserts, Socioeconomics & Unhealthy Eating

When residential areas are limited to accessing healthy food options based on where they are geographically located, this is known to be a Food desert. Some of the reasons for restrictions may be access to healthy and affordable food markets due to distance and inconvenient transportation. For instance, according to a report prepared for Congress by the Economic Research Service of the US Department of Agriculture, about 2.3 million people (or 2.2 percent of all US households) live more than one mile away from a supermarket and do not own a car (3). This is very alarming because even though some residences have public transportations available, their socio economic status may prohibit them from utilizing this service.

Many food deserts are found in communities where residents are minorities (African American and Latino) and low-income areas. Studies have found that wealthy districts have three times as many supermarkets as poor ones do (5), that white neighborhoods contain an average of four times as many supermarkets as predominantly black ones do, and that grocery stores in African-American communities are usually smaller with less selection (4). Typically the selection of food is cheaper or processed which means the ingredients are high in calories, fat, sugar and salt. When looking at food deserts in comparison to wealthier neighborhood, food is more expensive. For instance, while the overall price of fruits and

vegetables in the US increased by nearly 75 percent between 1989 and 2005, the price of fatty foods dropped by more than 26 percent during the same period (6). In addition, these types of neighborhood have accessibility stores that sell alcohol which can cause health concerns as well.. This is very eye opening to my students because the majority of them live in this type of environment and I could hold conversations around this topic. I can also relate a lot of this information to the mathematical standards.

Food Deserts & Health

Economically eating cheaper is more beneficial to families, however long term effects include the increase to higher rates of obesity. Higher rates of obesity occur in populations with low incomes and ethnic minorities which relate in type 2 diabetes and cardiovascular disease. Recently type 2 diabetes has increased across all demographics. Among all demographics, the greatest increase occurs in Native American youth (7) and African-Americans and Latinos of all age groups. These group suffered significantly higher in comparison to the white population which is a result to living in areas classified as food deserts. In terms of heart disease, a diet high in unhealthy fats and low-density lipoprotein cholesterol is a major cause. Children living in food deserts are at a greater risk due to the increased prevalence of obesity in those communities. (8) This will be an important piece of the awareness project because it will allow students to explore and topic, conduct research about how it connects to them and their communities.

Instructional Strategies

The lessons I plan to teach throughout this unit are listed below. Lessons can be modified to best suit the needs of the individual teacher and differentiated to serve the learning needs of students. The days listed below are an estimate of how long it will take the average teacher to get through the lessons. That may change depending on scheduling. The overarching goal is for students to be creative, critical thinkers while partaking in a curriculum that is designed for cross curricular instruction. Although the focus of the unit is on science and mathematics, there is an adequate amount literacy that is required. History is also sprinkled in when discussing origins and discoveries. The activities below are embedded throughout the unit to help

Frayer Models

Students in my course complete Frayer Models for their vocabulary terms to help them study terms and concepts. Students must place the term in the middle of four sections. The other sections are titled example, non example, facts and picture. Once students complete the Frayer Models they will use them for review. To check for understanding, I normally print out the templates and have students fill them in as a quiz. This works for any subject and my students are equipped to using these from my general math class.

KWL

Students will complete a KWL chart before learning about some topics. The KWL (Know, Want to Know, and Learned) is a graphical organizer designed to help in learning. The letters KWL are an acronym, for what students, in the course of a lesson, already know, want to know, and ultimately learn. I will have students fill in the column on the posters for what they already knew, and what they want to know using sticky notes. This allow me to identify their level of understanding and various concepts I need to elaborate on.

Discussion Boards/Journals/ Reflection

We will have a classroom discussion board about the results of the galley walk along with activities that we complete. When doing discussion boards, I always have the students comment to three others and provide feedback. This keep them engaged. The discussion board questions will allow students to reflect and respond to their classmates within their class. Pre-made reflection questions will be provided to students; students will respond to these questions. The journal entries and reflections are much more independent and gives students a free range of what to include in their papers. My students are creative and may include videos, diagrams, pictures, etc.

Gallery Walks

Students will participate is various Gallery Walks throughout this unit. Gallery walk is a classroom-based active learning strategy where students are encouraged to build on their knowledge about a topic or content to promote higher order thinking, interaction and cooperative learning. Student will also have the opportunity to create their own Gallery Walk with their final projects to present to the school. This will give them the opportunity to show off their work an teach their peers through awareness.

Art Expression

Students will create products for this unit in which they must create and use art as a form of understanding. Please be mindful to be sensitive to the students art and to design a rubric for the specific items you are grading. Another large component of the products that I implement in my class is the reflection. Students must explain their products thoroughly given the designed rubric. I also try not to limit the student's capabilities and allow them to be as creative as possible.

Performance Tasks

Performance tasks are activities and/or assessments that ask students to demonstrate a particular skill based on their understanding of the topic. I consider performance tasks and labs to be similar in structure however the lab portion is more so directed while the performance tasks requires students to use their own critical thinking. A performance task presents a situation that calls for learners to apply their learning in context and as the teacher I will be able to check for mastery of the learning standard(s). This unit is embedded with a plethora of performance tasks that can be found in the pacing.

Pacing Guide/Lesson Plans/Resources

The Pacing Guide and Lesson Plans are provided to provide a sense of structure for teachers who would like to incorporate this into their classroom. The pacing will vary based on student needs along with your school schedules. I have provided the order in which to teach the activities along with a description and attachments. I would encourage teachers to revise as needed to meet the needs of their students and personal teaching goals and to utilize parts that will be most beneficial.

Day(s): 1 & 2

Science Mini Lesson
What is DNA?

Math Mini Lesson
N/A

1) Frayer Models

Vocabulary Terms: Deoxyribose, Nucleotides, Phosphate Groups, DNA, Hydrogen Bonds, Base Pairs, Double Helix

2) Mini Lesson

Begin lesson with a discussion on the structure and components of DNA. Make sure to cover the 'backbone,' base pairs, hydrogen bonds, and the twisted double helix. Discuss the roles of the phosphate groups, deoxyribose and nucleotides. Following the discussion, have students complete the double helix 3d paper model to gain an idea of its structure. This will help them gain a better understanding of the base pairings.

3) Chemical Base Chain Practice

"Decoding DNA" See if you can break this code and solve the message that is hidden in the strands of DNA. - There will be several DNA sequences in which students must find, similar to a scavenger hunt. Once students solves the sequence, they must then find the code word for that sequence on the decoding poster. After students have correctly solved all problems, they will be able to solve the riddle.

4) Chemical Base Chain Candy Activity

Discuss what each material in the activity represents in the DNA structure:

- Twizzlers: phosphate groups
- Gummy savers: deoxyribose (sugars, which have ring structure)
- Gumdrops: nucleotides (chemical bases)

Green- G, Yellow- C, Red- A, and Orange- T (change as needed based on the color gumdrops being used)

Class Discussion explaining how to assemble the model.

If a student is unable to assemble the candy DNA model himself or herself, have them work with a partner or use the interactive DNA model building at <http://gslc.genetics.utah.edu/units/basics/builddna/>.

5) Creating Models

Students will create their own models using any material in which they desire. Students must label each part and provide a description of its function. Student models will vary and you may grade using the rubric provided below. In addition to the model, students must provide a one-page reflection discussing the topic and their findings.

	Level 1	Level2	Level 3	Level 4
Model	Student did not have any model	Student drew or printed a model	Student provided a 3d model with minor errors	Student provided a 3d model without errors
Labels	Student did not label the model	Student partially labeled the model with minor errors	Student labeled all parts of the model with minor errors	Student labeled all parts of the model without errors
Descriptions	Student did not provide any descriptions	Student partially provided descriptions with minor errors	Student labeled all descriptions with minor errors	Student labeled all descriptions without errors
Reflection	Students did not provide a full page reflection	Student provided at least half a page reflection with minor errors	Student provided at least a full page reflection with minor errors	Student provided at least a full page reflection without errors

Day 3

1) Science Mini Lesson
Heredity & Chromosomes

Math Mini Lesson

N/A

2) Frayer Models

Vocabulary Terms: Alleles, Traits, Heredity, Chromosomes

3) Where Did These Come From?

Students will be asked to provide a portrait of themselves and one of each parent. Students may use a family portrait as a substitution. Students who do not have access to photos may sketch a picture instead. In some scenarios, both parents may not be present and it is okay for students to focus on one parent or use another member of the family. Students will use the checklist to identify commonalities and discuss their findings. Students must then infer if the genes for their traits. Students will be given the opportunity to analyze traits of choice.

Mother Photo	Self Portrait/ Family Photo	Father Photo

Photo Analysis Checklist

Character Traits	Mother	Father	Other	Descriptions/Possible Alleles
1. Facial Bone Structure				
2. Ears				
3. Eyes				
4. Eye Brows				
5. Nose				
6. Mouth/ Smile				
7. Teeth				
8. Skin Complexion				
9. Hair Texture				
10. Hair Color				
11. Dimples/No Dimples				
12. Height				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

Materials Needed

Family Photos

Family Analysis Checklist

Days 4 & 5

1) Science Mini Lesson
Phenotype Vs. Genotype

2) Math Mini Lesson
Punnett Squares, Probability, Tree Diagrams & Combinations

Activities

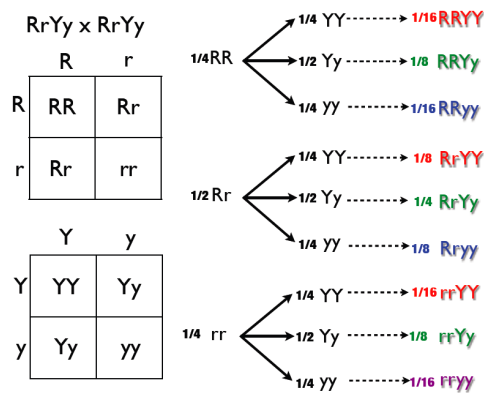
3) Frayer Models

Vocabulary Terms: Punnett Squares, Phenotype, Genotype, Probability, Likelihood, Tree Diagram, Combinations

4) Punnett Square Probability Practice

Punnett Square Practice will vary depending on teacher preference. Teachers may use workbooks, handouts, online platforms such as quizizz, school net, Gizmos, etc. The goal is for students to have some prior practice of utilizing Punnett squares.

5) Genetics & Tree Diagram Combinations & Personal Punnett Squares



Teacher will discuss this diagram with students and discuss how this correlates to mathematical combinations. Students will then create posters similar with alleles of choice. Students will be asked to create a model similar to the one above and to include illustrations for each combination. After students create their posters, they will conduct a gallery walk.

Materials Needed

Punnett Square Practice Material
Genetics Tree Diagram
Posters

Day 6

Science Mini Lesson
Genetic Mutations

Math Mini Lesson
N/A

1) Frayer Models

Vocabulary Terms: Mutations

2) Mutations Museum Gallery Walk & Class Discussion

Students will research and create a presentation on genetic mutations. Students will include the following items on the checklist. After completion, students will set up a museum on the hallway so that their peers and classrooms can visit.

Name of Mutation	Who discovered the mutation?	How is the mutation diagnosed?	Statistics	Can the mutation be prevented from passing onto offspring?
How was the mutation discovered?	Genetic cause	Can the mutation be treated?	Photos	Interesting Facts

3) Journal Entry

After students complete the gallery walk, they will complete their journal entries in which they must reflect on their findings.

Materials Needed

Materials for gallery walk

Journal Entry (google doc, notebook, discussion board, etc)

Day 7

Science Mini Lesson
Epigenetics & Nutrition

Math Mini Lesson
Ratios & Proportions

1) Frayer Models

Vocabulary Terms:

2) Epigenetics Video & Follow Up Questions

You can show students a video clip of how epigenetics alter based on nutrition. During the video, teachers can type up guided notes or provide probing questions.

3) Healthy Food Tracker Activity & Reflection

Students will be asked to track their nutritional intake by listing the items, quantity and calories. Students will do this for a week's span. After the first week, students will write a reflection paper based on their nutritional intake. They will include answers to questions such as why they chose the meal, the cost, where the meals came from, how healthy the meal was, serving size, etc. Students will then discuss their findings in small group discussions and create a poster to reflect their conversation. Students will also use their serving sizes to set up proportions in relation to mathematics.

	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Dairy	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Veggies	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Fruits	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
Grains	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆
Protein	☆☆☆	☆☆☆	☆☆	☆☆	☆☆☆☆	☆☆☆☆	☆☆☆
H2O	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
8 (8oz)	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆
Other Beverages							

Breakfast							
Snack							
Lunch							
Snack							
Dinner							
Evening Snack							
Total Calories							

Materials Needed
Epigenetics Video
Food Tracker Activity

Day 8

Mini Lesson

Food Deserts

Teacher will present material about food deserts to students to provide background knowledge.

1) Frayer Models

Vocabulary Terms: Food Deserts, Inferences, Data Analysis, Probability

2) Gallery Walk & Statistical Inferences

Teacher will place maps along the hallway that includes data from Charlotte NC and surrounding areas. Each region will be covered so that students can make inferences about which side of town they believe each map represents along with inferences about the data. Students will walk around with sticky notes and place their inferences on the maps. After we will have a class discussion based on our findings and I will reveal the various regions of Charlotte.

3) Map Analysis & Probability Activity

After students have reviewed the maps and had open discussions, we will then focus on likelihoods and probabilities based on the given information.

4) Do you live in a Food Desert Activity & Reflection Using Online Portal

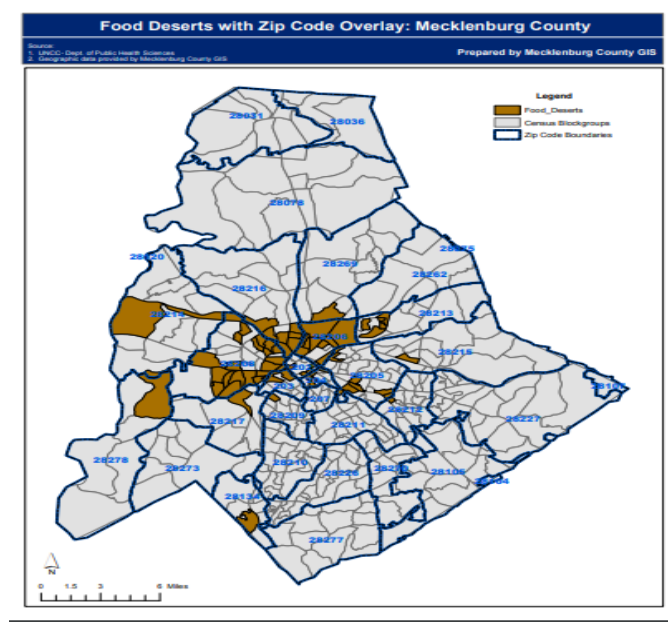
Students will then log into their chrome books and use the statistical atlas.

<https://statisticalatlas.com/school-district/North-Carolina/Charlotte-Mecklenburg-Schools/Overview>

Materials Needed

Gallery Walk Materials

Online Access



Days 9 & 10

Mini Lesson

Socioeconomics & Unhealthy Eating

- 1) Frayer Models: Socioeconomics, Distance Formula, Pythagorean Theorem
- 2) Using Distance to find local health resources

Students will receive various google maps that include areas close to their homes. (based on zip codes) Students will be asked to find the distances between certain health resources such as doctors, hospitals, gyms, smoothie shops, etc... Students may use the distance formula or Pythagorean Theorem to solve the problems. After students have solved, we will hold a group discussion about their findings and make inferences. We will also refer back to the likelihoods.

- 3) Family Scenarios & Budgeting Activity

Students will create random family make-ups (ie: 3 daughter, 1 son, 1 mother) along with a dinner night budget (i.e.: \$40). After students randomly select, you will have the students visit 3 restaurants (local fast food, middle class, five star dining). Students must select items for their entire family. Students will get creative such as splitting meals, buying water, etc. After students decide their meals, they will complete the follow up sheet and reflect on how this relates to healthy food choices, budgeting, food deserts, etc.

Materials Needed

Maps

Restaurant Menus

Family & Budgeting Cards

Days 11 & 12

Mini Lesson

Food Deserts & Health

1) Frayer Models: Proportions

2) Proportional Recipes Activity

Students will be given healthy recipes in which they must convert to meet the needs of their family size. Teachers may use recipes of choice. You may even have the students find one. Students will set up proportions and show their work for each problem.

3) Personal Goal Setting Activity

At the end of the nutritional unit, please have students' goal set. We will do a personal goal setting activity in which students will create realistic goals that they want to work on that will have a positive impact on their epigenetics.

Materials Needed

Recipes

Goal Setting Sheets

Days 13 & 14

Mini Lesson Advocacy

1) Frayer Models: Advocacy, Unit Rates

2) Personal Mural & Class Mural

Students will read the article listed below about how students are using mural to express themselves and send messages. After reviewing the article, students will be asked to create a personal mural about epigenetics and providing awareness. The awareness mural can include anything they have learned from this unit along with any other meaningful messages. After students create their mural, they will be asked to type a one-page reflection paper describing their mural and their message behind it. After students will come together and create one large class mural.

<https://inside.uncc.edu/featured-stories/murals-that-motivate>

3) Awareness Project

Students will create a portfolio in which they include epigenetics and the impact it has on our health. Students will provide an essay, presentation and artifacts. Rubric will vary depending on teacher. Students will then participate in an awareness fair similar to a science fair and show off their hard work.

Materials Needed

Article
Art Supplies

Assessments

Informal assessments will take place after students have submitted activities to the lessons. Formal assessments will more so include projects and standard checks. Standard checks will occur weekly to identify if students have successfully mastered concepts. Reinforcement and differentiated instruction will provided to students who have not showed proficiency.

Appendix 1: Implementing Teacher Standards

<p>Science 7.L.2 Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation and survival among offspring</p>	<p>Math .7.SP.1 Understand that statistics can be used to gain information about a population by:</p> <ul style="list-style-type: none"> •Recognizing that generalizations about a population from a sample are valid only if the sample is representative of that population. •Using random sampling to produce representative samples to support valid inference 	<p>Math 7.SP.7 Develop a probability model and use it to find probabilities of simple events.</p> <p>Math 7.SP.8 Determine probabilities of compound events using organized lists, tables, tree diagrams, and simulation when the sample space is represented using organized lists, tables, and tree diagrams.</p>
<p>Science 7.L.2.1 Explain why offspring that result from sexual reproduction (fertilization and meiosis) have greater variation than offspring that result from asexual reproduction (budding and mitosis)</p>	<p>NC.7.SP.2 Generate multiple random samples (or simulated samples) of the same size to gauge the variation in estimates or predictions, and use this data to draw inferences about a population with an unknown characteristic of interest</p>	<p>NC7.RP.A.2 Recognize and represent proportional relationships between quantities.</p>
<p>Science 7.L.2.2 Infer patterns of heredity using information from Punnett squares and pedigree analysis.</p>	<p>NC.7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring</p>	
<p>Science 7.L.2.3 Explain the impact of the environment and lifestyle choices on biological inheritance (to include common genetic diseases) and survival</p>	<p>Math 7.SP.6 Collect data to calculate the experimental probability of a chance event, observing its long run relative frequency. Use this experimental probability to predict the approximate relative frequency.</p>	

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