Lesson Topic: Genes and Traits

Objective:
Students will be able to:

1. Identify dominant and recessive traits.
2. Create a graph based on a class data table.
3. Determine how traits are passed down from parents to offspring.

Time Required: 95 minutes

Materials Needed:

- Teacher computer with internet access
- Projector/Smartboard
- 1 computer/laptop/iPad per student with internet access
- Genes and Traits handout (attached)
- Trait Images (attached) *Blue eyes and Brown Eyes images were not included as there is so much variance and should have many examples throughout the class.
- M&Ms (or any small item that has different colored options: beads, pom pons, skittles etc). (6 per color, per group).
- 7 cups (per group)
- Colored pencils

Teacher Preparation:

- Assign a Legends of Learning Instructional Quick Play playlist for the day(s) you will be teaching the lesson.
    - Instructional - Middle School - Genes and Traits
- Assign a Legends of Learning Content Review Quick Play playlist for the day(s) you will be teaching the lesson.
    - Content Review - Middle School - Genes and Traits
- Make copies of Genes and Traits Worksheet (1 per student)
- Place M&Ms (or other item) in baggies (6 per color, at least 4 different colors) (1 baggie per group)

Engage (20 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Instructional playlist.
2. Assist students as needed during game play, pause playlist if you need to address content or questions to the entire class.

Explore (25 minutes):

1. Show students the images of each of the traits (attached).
    a. If available, pass out mirrors to students to share to look at their traits.
2. Have students answer their trait questions on the Genes and Traits handout.
3. Go through each trait on the handout and take a poll of the class.
    a. “Raise your hand if you have a widows peak,” etc.
4. Keep track of the data on the board and have students copy it down on their handout.

5. Have students create a bar graph based on their class trait data on their handout.
    a. They need to use two different colors as a key to represent the dominant and recessive traits.

Explain (20 minutes):

1. Tell students “As you can see, everyone is so very unique and different with so many different combinations of traits. We get our traits from our parents. The recipe of how we are put together is in our DNA, which are on chromosomes. We get half of our chromosomes from our mom and half from our dad.”
2. Ask students “Who has a sibling? A brother? A sister? Now, if we get half our traits from each parent, and we have the same parents as our siblings, why do we look different from our siblings?”
    a. Answer: We do look similar to our siblings, but each of us is a new combination of chromosomes and traits of our parents; same ingredients, different combination.
3. Tell students “Each of our traits can be thought of as either dominant or recessive.
    a. Dominant traits are always seen, and can hide recessive traits. Dominant traits are seen, but some maybe carrying a recessive trait that can be passed on to the kids.
    b. Recessive traits are hidden by the dominant traits but can be seen if there are two recessive genes together.”
4. Tell students “Let’s think about eye color. Brown eyes are dominant, and blue eyes are recessive. Let’s say that a B represents a brown eye gene, and the b represents a blue eye gene.
5. Write the following on the board:
    a. BB = brown eyes
    b. Bb = brown eyes (but carries the blue eyed gene)
    c. bb = blue eyes
6. Ask students “The only way that blue eyes will be seen is if there are two little b’s. Is it possible for two brown eyed parents to have a blue eyed child?”
    a. Give students time to discuss with a partner.
    b. Yes! If both parents have Bb then they could have a blue eyed baby.
    c. Draw the following on the board:
        i. Mother = Bb Father = Bb
        Child = bb
7. Tell students “Whenever there is an uppercase letter and a lower case letter = heterozygous (Bb) Whenever the two genes are both the same = homozygous
    a. Both lower cased = homozygous recessive (bb)
    b. Both upper cased = homozygous dominant (BB)
8. Ask for three volunteers to come to the board.
    a. Have one student write an example of a heterozygous pair (Bb)
    b. Have one student write an example of a homozygous recessive pair (bb)
    c. Have one student write an example of a homozygous dominant pair (BB)

Elaborate (20 minutes):

1. Have students get into small groups or partners (depending on available materials).
2. Pass out 7 cups to each group.

3. Tell students to place each cup on a circle on their handout.
4. Pass out the M&Ms (or other item).
5. Write the following on the board: (The colors can be different based on the materials you are using, but just be consistent).
    a. Grandma A = red
    b. Grandpa A = green
    c. Grandma B = yellow
    d. Grandpa B = blue
6. Tell students to place 6 of each color in the appropriate cups.
7. Then, tell students to place 3 M&Ms from Grandma A and 3 M&Ms of Grandpa A into the Mother cup.
8. Do the same with Grandparents B into the Father cup.
9. Tell students "Now, without looking, randomly pull out 3 M&Ms from the mother cup and place them into the "Me" cup. Do the same thing with the father cup and randomly pull out 3 M&Ms from the father cup and place it into the "Me" cup."
10. Students should look into the Me cup and see where they got their traits.
11. Repeat this activity so each student in the group gets a chance to create their own "Me" cup.
    a. Have students write out in the "Me" cup circle, what combination of colors they ended up with.
12. Once all students have finished their questions, tell them they can eat their M&Ms. Then, ask some questions together as a class.
    a. What kind of combinations did you get?
    b. Did anyone get traits from only one of their grandparents? (it could happen).
    c. How does this activity illustrate how traits are passed to offspring? (We get half of our DNA from our mother and half our DNA from our father. The DNA is in chromosomes. The M&Ms represent the chromosomes and the traits passed on those chromosomes).
13. Collect the cups and baggies.

Evaluate (10 minutes):

1. Have your students sign in to Legends of Learning. Instruct students to complete the Content Review playlist.
2. Analyze student results to determine what concepts need to be a focus for reteaching.

Additional Lesson Strategies:

- To use Legends for additional instruction, create a custom playlist with an instructional game and pre and post assessment.
- To use Legends for a quick formative assessment, create a 5-question assessment in a playlist.
- To use Legends for a student-directed experience, create a targeted freeplay playlist.
- Encourage students to play on their own at home in Legends of Learning: Awakening for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Name:_____

Genes and Traits

For each number, circle which trait you have. Then, together as a group, write down the number of each trait that is found in your class.

Total Number of Students: _____

	Dominant Trait	***Number***	***Recessive Trait***	***Number***
1	Free ear lobes		Attached ear lobes	
2	Widow's peak		No widow's peak	
3	Curly hair		Straight hair	
4	Cleft chin		Smooth chin	
5	Smile dimples		No smile dimples	
6	Brown eyes		Blue/green/hazel eyes	

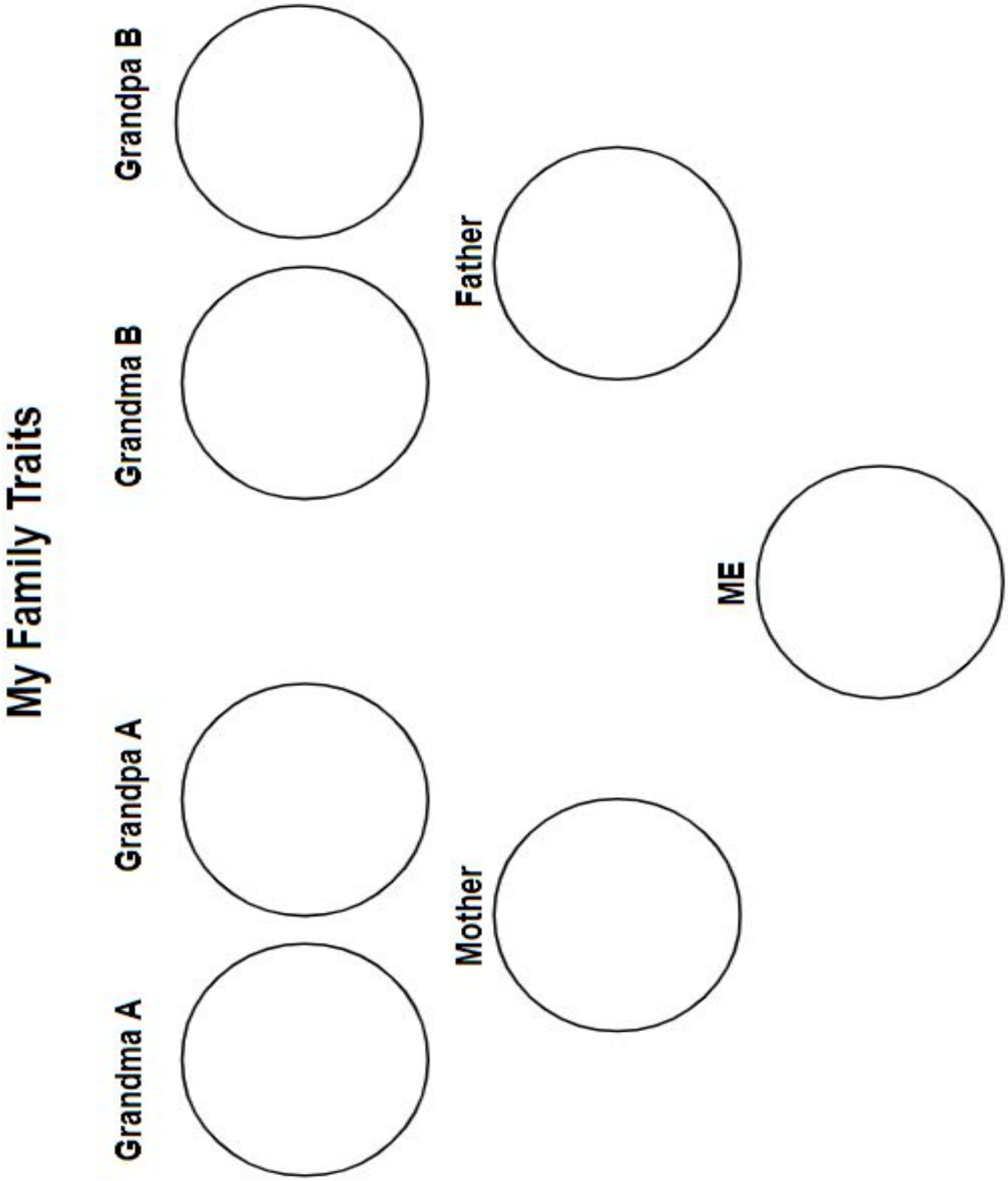
Using the data in the table, create a bar graph. Be sure to label each axis and give the graph a title. Then, use 2 separate colors, one color to represent the dominant traits and one color to represent the recessive traits. Be sure to indicate which color is which by filling in the key at the bottom.

#1	#2	#3	#4	#5	#6

Traits

Dominant Trait:

Recessive Trait:



Trait Images

Free Earlobes Attached Earlobes

Widows Peak

No Widows Peak

Curly Hair

This Photo by Unknown Author is licensed under CC BY-SA

Straight Hair

This Photo by Unknown Author is licensed under CC BY

Cleft Chin

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No Cleft Chin

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Smile Dimples

	
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