Inherited Traits and Learned Behaviors

Lesson Synopsis:

Students will distinguish between learned behaviors and inherited traits through activities such as word sorts, and charades.

TEKS:

8.11	***The student knows that traits of species can change through generations and that the instructions for traits are contained in the genetic material of the organisms.***
8.11B	**Distinguish between inherited traits and other characteristics that result from interactions with the environment.**

PROCESS TEKS:

8.2	***The student uses scientific inquiry methods during field and laboratory investigations.***
8.2B	**Collect data by observing and measuring.**
8.2C	**Organize, analyze, evaluate, make inferences, and predict trends from direct and indirect evidence.**
8.2D	**Communicate valid conclusions.**

GETTING READY FOR INSTRUCTION

Performance Indicator(s):

- Identify inherited traits in a scenario and create a Punnett square to predict possible outcomes from events in the scenario. (8.11B, 8.11C)
  ELPS ELPS: 1C, 1E, 1H, 2E, 2I, 3D, 3H, 4E, 5B, 5G

Key Understandings and Guiding Questions:

- An organism survives in its environment through its learned behaviors and inherited traits. 8.11B
  - What is the key difference between inherited traits and learned behaviors?
  - What are some examples of behaviors that are learned?
  - What are examples of traits that are inherited?

Vocabulary of Instruction:

- dominant trait
- inherited trait
- interaction
- learned behavior
- recessive trait

Materials:

- highlighter
- glue

Resources:

- **STATE RESOURCE**
  - Xtreem Science – Teacher Quality Grant 8th Grade – To Be or Not to Be

Advance Preparation:

1. Run copies of the following handouts:
   - **Inherited Traits-Class Survey** (1 per pair of students)
   - **Inherited Traits Survey Graph** (1 per pair of students)
   - **Inherited Traits Survey Rubric** (1 per pair of students)
   - **A Family's History** (1 per student)
2. Prepare:
   - **Charades:** cut them apart and place in a container to draw from.

- Card set: **Learned Behaviors and Inherited Traits** by printing a class set, cutting them apart, and laminating them.

Background Information:

Organisms must respond and adapt to their environment in order to survive as a species. Responses are part of an organism's behavior. Adaptations occur over time. Adaptations are passed from parent to offspring as inherited traits. Some inherited traits are dominant, while others are recessive. We use symbols to represent traits. Traits can also be traced through several generations using a pedigree chart.

GETTING READY FOR INSTRUCTION SUPPLEMENTAL PLANNING DOCUMENT

Instructors are encouraged to supplement, differentiate and substitute resources, materials, and activities to address the needs of learners. The Exemplar Lessons are one approach to teaching and reaching the Performance Indicators and Specificity in the Instructional Focus Document for this unit. A Microsoft Word template for this Planning document is located at www.cscope.us/sup_plan_temp.doc. If a supplement is created electronically, users are encouraged to upload the document to their Lesson Plans as a Lesson Plan Resource for future reference.

INSTRUCTIONAL PROCEDURES

Instructional Procedures	Notes for Teacher
ENGAGE	**NOTE:** 1 Day = 50 minutes Suggested time: Day 1
Inherited/Learned T-chart 1. Using their journals, ask students to fold a page in half vertically. 2. On one side, have them write the title "What I've Inherited" and write "What I've Learned" on the other side. 3. Give students 5 minutes to write their responses in the two columns. 4. Have students share their results with the class, comparing each other's similarities. 5. Discuss the difference between inherited traits and learned behaviors.	 Fold page in half vertically and put titles on each side to record responses.
EXPLORE	Suggested time: Day 1
Learned Behavior Charades 1. Divide the class into two groups and have the slips of paper from the **Charades** handout cut and ready. 2. One person from each group will have a chance to select a slip of paper with a behavior for them to act out for the class. While acting it out, no words may be used. 3. That student's group will have one minute to correctly identify the behavior. If correct, the team is awarded one point. 4. If the team is incorrect, the opposing team will have a chance to guess. If correct, they get the point. 5. The second team then gets to act out their selected paper. 6. The group with the most points at the end of the period wins. 7. Have students add to the T-chart any new learned behaviors.	 **MATERIALS** • Card Set: **Charades** Keep time for each group. This game should be fast-paced! Alternative activity: In their journals, students identify the topic on the card as inherited or learned and give evidence to support their choice.  Add any new learned behaviors to the T-chart.

Instructional Procedures

Notes for Teacher

EXPLORE

Suggested time: Day 2

Inherited Traits Survey

1. Allow students to choose a partner.
   Ask:
   - **What are some examples of traits that are inherited?** *Answers may vary.*

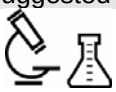
2. In pairs, they will complete the first two columns on the data table on the handout: **Inherited Traits-Class Survey** by observing each other's traits.

3. Once everyone has a chance to finish, as a class, complete the Group Data table.

4. After both parts of the Group Data table have been filled out, students will use the results from the Group Data table to construct a bar graph of their findings. Graph paper is provided on the handout: **Inherited Traits Survey Graph**.

5. Remind students that graphs must have a relevant title, properly labeled axes, and a key. Use the handout: **Inherited Traits Survey Rubric** as needed.

6. Tell students that when graphing, they need to try to use as much of the graph paper as possible. This means that the graph should not be on one corner of the paper. It should cover most, if not all, of the graph paper.



MATERIALS

- Handout: **Inherited Traits-Class Survey** (1 per pair of students)
- Handout: **Inherited Traits Survey Graph** (1 per pair of students)
- Handout: **Inherited Traits Survey Rubric** (1 per pair of students)

MISCONCEPTION

- Daughters inherit most of their characteristics from their mothers and boys inherit most traits from their fathers.

Note:
The purpose behind both of these activities is to give students more everyday examples of inherited traits and learned behaviors. While these activities are taking place, the teacher needs to monitor student's train of thought by walking around the room, ensuring that everyone understands the difference between inherited traits and learned behaviors.

EXPLAIN

Suggested time: Day 2

Notes: Symbols Used in Genetics

1. In their journals, have students revisit the list they made during the Engage portion of this lesson.

2. Have them highlight the learned behaviors in one color and the inherited traits in another.

3. Using the class survey table of their inherited traits, identify those traits that show up most often in the group. These are probably dominant traits. The traits that show up least often are probably recessive.

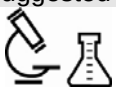
4. Remind students that inherited traits usually are paired (tall/short, brown eyes/not brown, left handed/right handed).

5. Ask them to identify the complementary trait to the one they inherited. Have them write it next to their inherited trait.

6. Say to the students: **In science, we use symbols to represent ideas.** Remind students of representing atoms with letters.

7. We use letters to represent traits so we can trace them through several generations.

8. In your journals, record that a capital letter represents a dominant trait and



MATERIALS

- highlighters

Revisit the list made in the Engage activity.

Note:
In 6th and 7th grade, students investigated dominant and recessive traits.

Example: Tall/ short
T / t

RR Rr rr
RR - homozygous dominant
rr - homozygous recessive
Rr - heterozygous

Instructional Procedures

the lower case of the same letter is used to represent a recessive trait.

9. The genes for traits are inherited in pairs, one from the mother and one from the father. In your journals, write down as many combinations of genes that are possible for a single trait. (Suggest right handed/left handed).

10. If both letters are capital, we refer to that as a homozygous dominant genotype. If they are both lower case, it is called homozygous recessive. If there is one capital and one lower case letter, it is called heterozygous. Record these terms in your journals.

11. We also use symbols to create a family tree. In science, a family tree that is used to trace traits is called a pedigree. Write this in your journal.

12. On a pedigree, a circle represents a female, a square represents a male. If the figure is shaded completely in, that individual has the trait that is being traced. If the figure is half-shaded, that individual is hybrid (heterozygous) for the trait. If the figure is not shaded, the individual does not have the trait.

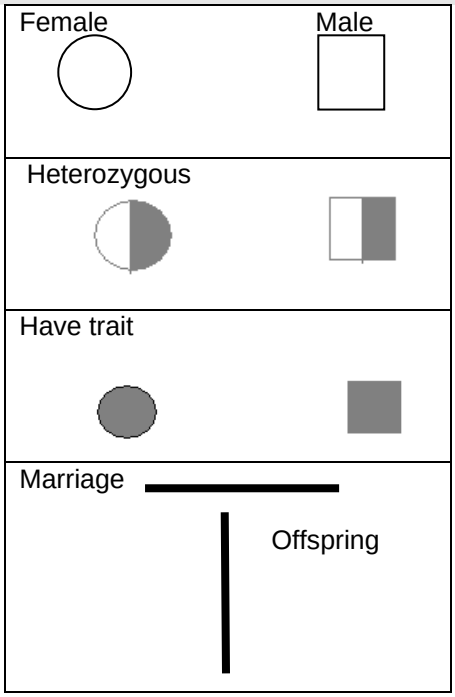
13. Unions are represented by horizontal lines, and offspring are represented by vertical lines.

14. In your journals, create a pedigree for your family. Do not include a trait right now; just show your parents and siblings.

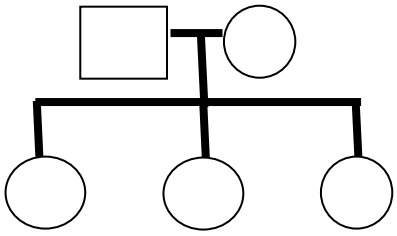
15. If we were tracking a dominant trait like tongue rolling, we would shade the family members who could roll their tongue. Using this information we learn about the genetic make-up of the family.

16. We can use this information to track more serious genetic disorders through a family.

Notes for Teacher



My Family Pedigree: (complete your own as an example for students)



Walk around checking their pedigrees. It is fun to see where they are in the family and it provides a personal link.

For enrichment, you may have students investigate genetic traits such as hemophilia, Tay Sachs, or Sickle cell anemia.

ELABORATE

Suggested time: Day 3

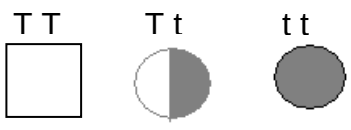
A Family's History

1. In this activity, have the students create a pedigree from the information they read in **A Family's History**.

2. Have them fill in as much detail about each family member as possible. Have them record the genotype above each shape.

MATERIALS

- Handout: **A Family's History** (1 per student)
- glue



Instructional Procedures

EVALUATE

Learned Behaviors and Inherited Traits Card Sort

1. Have the students sort the set of cards into two stacks, “learned behaviors” and “inherited traits.”

2. Tell them to create a data table to show their results in their journals.

3. Under the data table, have the students explain the difference between a learned behavior and an inherited trait.

Notes for Teacher

Suggested time: Day 3

MATERIALS

- Card set: **Inherited Traits and Learned Behaviors**

Create data table to show results.

Charades

Biting your fingernails
Checking both ways before crossing a street
Tying your shoelaces
A lion hunting for food
Taking a bath
Birds building a nest
Cats bathing their young
Swimming
Squirrels burying acorns
Dogs recognizing their food and water bowls

Inherited Traits-Class Survey

Directions:

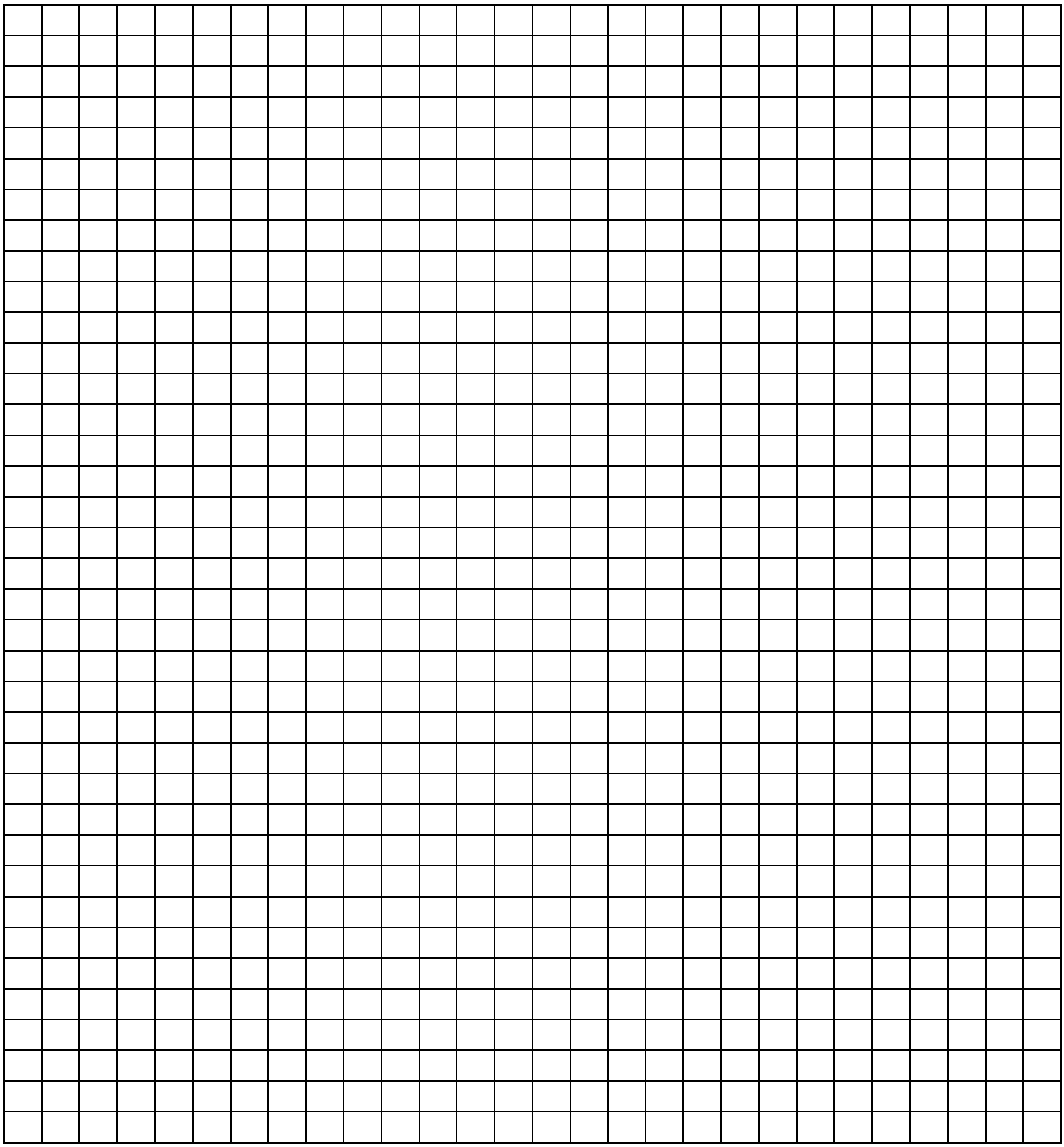
1. Choose a partner.
2. Complete the first two columns of the data table by looking at each other's traits.
3. Once everyone has a chance to finish, you will complete the last column of the data table "Group Data," together as a class.
4. After both parts of the data table have been filled out, use the results from the "Group Data" table to construct a bar graph of your findings. (Graph paper is attached)
5. Remember graphs must have a relevant title, properly labeled axes, and a key.
6. When graphing, try to use as much of the graph paper as possible. This means that the graph should not be on one corner of the paper. It should cover most, if not all, of the graph paper.
7. The rubric that will be used to grade your graph is included.

Pair Data

Trait	You		Your Partner		Group Data	
	YES	NO	YES	NO	YES	NO
Are you Female?	-	-		-	-	
Are you Right Handed?	-	-		-	-	
Do you have Attached Ear lobes?	-	-		-	-	
Can you roll your tongue?	-	-		-	-	
Do you have a Widow's Peak?	-	-		-	-	
Do you have a Cleft Chin?	-	-		-	-	
Do you have a Hitch Hiker's Thumb?	-	-		-	-	
Do you have Cheek Dimples?	-	-		-	-	

Total Number of Participants in your group:

Inherited Traits Survey Graph



Inherited Traits Survey Rubric

Criteria						Value
	0	5	10	15	20	
Title	Category not attempted	A title is not present.	A title is present at the top of the graph.	Title clearly relates to the problem being graphed (includes dependent and independent variable) and is printed at the top of the graph.	Title is creative and clearly relates to the problem being graphed (includes dependent and independent variable). It is printed at the top of the graph.	
Units		Units are neither described nor appropriately sized for the data set.	All units are described (in a key or with labels) but are not appropriately sized for the data set.	Most units are described (in a key or with labels) and are appropriately sized for the data set.	All units are described (in a key or with labels) and are appropriately sized for the data set.	
Labeling of X Axis		The X axis is not labeled.	The X axis has a label.	The X axis has a clear label that describes the units used for the independent variable.	The X axis has a clear, neat label that describes the units used for the independent variable (e.g., days, months, participants' names).	
Labeling of Y Axis		The Y axis is not labeled.	The Y axis has a label.	The Y axis has a clear label that describes the units and the dependent variable (e.g., % of dog food eaten; degree of satisfaction).	The Y axis has a clear, neat label that describes the units and the dependent variable (e.g., % of dog food eaten; degree of satisfaction).	
Neatness and Attractive-ness		Appears messy and "thrown together" in a hurry. Lines are visibly crooked.	Lines are neatly drawn, but the graph appears quite plain.	Neat and relatively attractive. Ruler and graph papers (or graphing computer program) are used to make the graph more readable.	Exceptionally well designed, neat, and attractive. Colors that go well together are used to make the graph more readable. Ruler and graph paper (or graphing computer program) are used.	
Teacher Comments: Total						_____

A Family's History

This is the unofficial lineage of a family, recorded in an effort to track the recessive trait allowing a person to have super powers. This history will cover three generations of this super-powered family. Unfortunately, this is a transcript of a conversation between myself and an old historian. It is in text form, but needs to be represented symbolically on a pedigree.

It is your task to create a pedigree for this family and label each name below their shape, shading those members who have super powers, half shading those who are heterozygous for the trait, and identifying the genotype of as many family members as possible. Be very thorough in this endeavor, because you will need this information in the future. (Cut this out and glue it into your journal)

The lineage begins back in obscurity, before official records were kept to show marriages and births. The oldest generation that I was able to trace had the young hero Wilberforce as its patriarch. As a young man, he caught the eye of Runion, who gladly consented to be his wife. Runion worked hard everyday to do dishes, keep the garden, and do laundry. In time, they were blessed with four children.

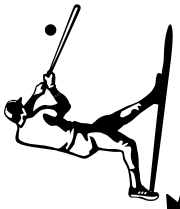
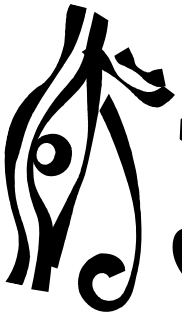
The oldest was a strapping lad named Pinckney. As Pinckney grew, he took over tasks like gardening for his mother because it was hard work. Pinckney was able to farm much more than his mother, but still had to toil. The second child was rather frail and sickly. Imogene never was able to get outside to help with the chores, but her super strength helped her mother with the drudgery of lifting laundry baskets and feed sacks. The twins, Rufus and Ralph, were born next. Rufus and Ralph were not identical twins, but they did have bright yellow hair, which stood on end. If anyone teased Rufus about his hair, they would regret it because he would mutter under his breath and run around them so fast their hair would stand on end. Ralph however had to settle things the old fashioned way…but over time he learned to simply ignore the insults.

In time, this generation grew old enough to establish their own homes. Pinckney met a hard working lady with brilliant auburn hair. Grenoch worked the fields right alongside her husband, not thinking of the blisters and aches each day brought. Grenoch was the only daughter of the most powerful hero in the area. Pinckney and Grenoch had two non-super powered boys, Casper and Credence. Imogene never married; she stayed with her parents until her untimely death from a sneeze that caused her to loose her balance while she was helping hold up the house to level it. Rufus married a skilled heroine from a town three days travel from his home village. Together they had one girl, Dynemia. Ralph also married a heroine and had five children. The two oldest were girls, Blanche and Ambrosia, the youngest boys, Rubeus, Ruddy, and Horatio. Of these five, only Blanche was sent off to school to perfect her power of x-ray vision.

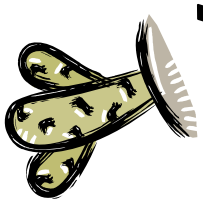
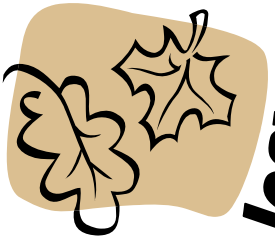
Learned Behaviors and Inherited Traits KEY

Learned Behaviors	Inherited Traits
Avoiding bad-tasting prey	Shape of nose
Speaking with an accent	Shoe size
Ability to hit a baseball	Eye color
Hunting	Shape of a bird's beak
Type of music one enjoys	Shape of leaves
	Cactus spines
	Color of feathers

Learned Behaviors and Inherited Traits (pp. 1 of 2)

Shape of your nose 	Speaking with an accent	Ability to hit a baseball 
Your shoe size 	Type of music you enjoy 	Eye Color 

Learned Behaviors and Inherited Traits (pp. 2 of 2)

Shape of a bird's beak 	Avoiding bad-tasting prey 	Hunting 
Cactus spines 	Color of feathers 	Shape of leaves 

A Family History KEY