5th Grade
Science

Inherited Traits and Learned Behaviors

Traits

5-10B

Reflect

A chimpanzee moves through the forest, looking for food. It spots an anthill about a meter away and moves toward it. Using its long arms, the chimpanzee grabs a thin branch from a tree overhead. First, the chimpanzee takes all the leaves off the branch. Then it sticks the branch down the anthill. A few seconds later, the chimpanzee pulls the branch out. It is covered with ants. The chimpanzee puts the branch in his mouth and quickly eats all the ants. The chimpanzee is able to eat the ants without getting bitten.

The chimpanzee was born with long arms, good eyesight, and fingers. But it was not born knowing how to use a branch to get a snack. What are some characteristics that animals and other organisms are born with? How do they get those characteristics? What are some characteristics that appear or develop after birth?

organisms: living things

What is the difference between an inherited trait and a learned behavior?

Take a look at the mother and daughter in the picture at the right. How do they look similar? The mother passed on some of her characteristics, or *traits*, to her daughter. The daughter has her mother's hair color, nose shape, and eye color. These traits were *inherited*. When traits are inherited, it means they are passed on from parents to their offspring during reproduction.

offspring: new living things that come from parents who have reproduced

Look out!

Some traits are not inherited. The mother has pierced ears and wrinkles. She did not inherit these traits from her parents. They developed some time after she was born. Characteristics that appear during a person's lifetime are called *acquired traits*. Certain acquired traits, like pierced ears, can be directly observed. These are *physical traits*.

Another type of acquired trait is *learned behavior*. Reading is an example of learned behavior. You inherit eyes that can see and hands that can turn the pages of a book. However, you do not know how to read when you are born. You have to learn how to read. Learning is something that happens during your lifetime.

Traits

5.10B

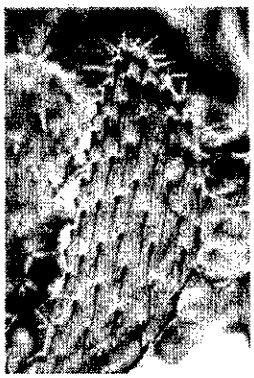
Many physical traits like eye color and skin color are inherited. But not all physical traits are inherited. For example, have you ever broken a bone? Do you have any scars? These are characteristics that appeared some time after birth. You were not born with a broken bone or a scar. These types of traits are not passed from parents to children.

What are some examples of plant and animal inherited traits?

Have you ever seen a beautiful garden of flowers? The color of the flowers is an inherited trait. The general height of the plants, the length of the roots, and the shapes of the leaves are all inherited characteristics. A cactus inherits spines. An evergreen tree inherits needles. These are traits that are passed on from a plant to its offspring.

Most of the traits you see in an animal are inherited. A lion cub inherits claws, sharp teeth, and tan fur from its parents. Some traits you cannot see are also inherited. A lion cub inherits the need to eat meat. It also inherits the bones, muscles, and other structures that help it function as a predator.

predator: an animal that hunts and eats other animals



cells: the basic unit of living things

What are some examples of plant and animal acquired traits?

Plants do not have brains and do not learn behaviors like animals do. But plants can respond to changes in their environment. Some plants have special chemicals in their cells that help them turn toward sunlight. Getting enough sunlight helps plants to make their own food. When a fly lands on a unique plant called a Venus flytrap, the plant responds by closing its modified leaves that look like "jaws" to eat the fly. The ability to respond to these environmental changes, however, is inherited for the plant.

Lion cubs inherit the physical traits they need to be hunters. They have claws and sharp teeth to help them catch and bite their prey. Their tan fur helps them blend into their grassy environment. They have good vision and an excellent sense of smell. But when lion cubs are born, they do not know how to hunt. Hunting is an example of a learned behavior. Cubs have to learn how to hunt by watching their parents. They may even "hunt" each other as practice when they are cubs. It takes months for lion cubs to learn how to use their inherited traits to help them catch and kill food.

These young lions are learning how to hunt.

Traits

A songbird inherits a beak and lungs that help it sing, but it often has to learn the songs from another bird. Evidence of songbird learning includes slight differences across the country for a particular sparrow. Since the adult birds are learning from birds only in their area, the songs can vary across a large distance. A dog learns tricks from its owner. Even you had to learn certain behaviors. As a newborn, did you know how to talk or ride a bicycle? You had to learn these behaviors. You were not born knowing how to do them.

What do you think?

A family adopted a new puppy. Whenever the family members want to take the puppy for a walk, they call him to come to the door. At the same time, one family member grabs a set of keys. After a while, they notice that whenever someone grabs the keys, the puppy comes to the front door without anyone calling him. Is this an inherited characteristic or a learned behavior? Explain your answer.

Getting Technical: Wildlife Cameras

Suppose you are a scientist who is trying to learn about the behavior of bald eagles when they are in their nests. If you climb up a tree to watch the nest, you might scare the eagles away. Even if you could find a way to stay hidden, you cannot stay in a tree all day and night! Luckily, technology can help you out. Scientists have started using cameras that can send video images over the Internet. These cameras are called webcams. A person studying bald eagles might put several webcams around the nest before the eagles arrive for the season. The webcams can stay on day and night and record all the activity in the nest. Scientists can use this technology to study how animals like bald eagles learn behaviors from their parents.

TRY IT!

Try the following activity to explore more about the difference between inherited traits and learned behaviors.

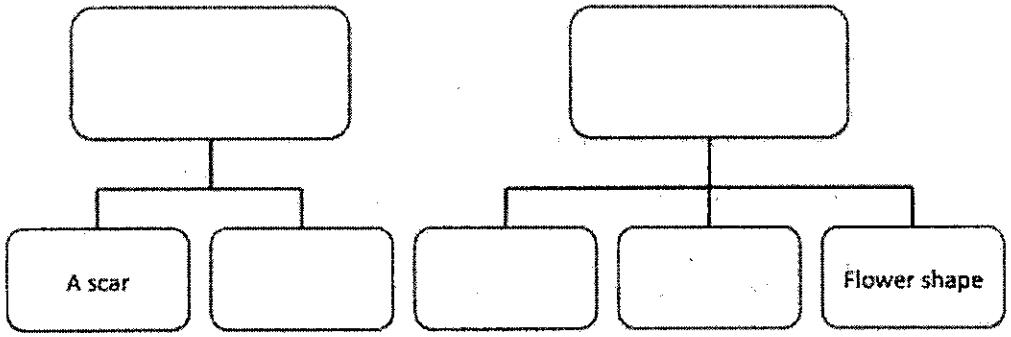
1. Place a coin on the back of your hand. Tilt your hand so the coin begins to slide off. As it falls, try to turn your hand to catch the coin. Record whether or not you caught the coin.
2. Try to catch the coin 10 more times. Record the results each time.
3. What happened during the second try? What about the 5th try or the 10th try? Did it get easier or harder to catch the coin?
4. Is the ability to catch the coin an inherited trait or a learned behavior? How do you know?

Traits

What Do You Know?

Use what you have learned about inherited and acquired traits to complete the graphic organizers. Read each term in the box below. Then decide where it belongs and write it in the correct space on the graphic organizers on the next page. Some spaces have been completed for you.

• Acquired traits	• Inherited traits
• Sharp claws	• Blood type
• Riding a bike	



Traits

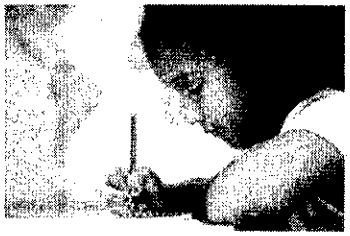
5.10.B

Connecting with your child

Learning and Unlearning Skills

To help students learn more about the difference between inherited traits and learned behaviors, try this activity:

1. Time students as they write the following sentence, "Inherited traits are different than acquired traits." Make a record of how long it took to write the sentence.
2. Now, time students as they write the same sentence with their non-dominant hand. Did it take them a longer or shorter time to write the sentence?
3. Now ask students to write the same sentence as quickly as they can. This time, they are not allowed to dot the letter "i" or cross the letter "t."



Writing is a learned behavior, and children are not born knowing how to write. They have the musculoskeletal structures that enable them to grasp a pencil, but they do not know how to draw or write words. However, at a certain age, writing comes so naturally that children often forget that they had to learn how to do it. The difficulty a child has when writing with his or her non-dominant hand is meant to demonstrate that writing is not an inherited trait. Children have to acquire and learn the skill. The difficulty they have leaving a letter "i" un-dotted and a letter "t" un-crossed demonstrates how hard it is to unlearn a skill. Once a behavior is learned, it tends to "stick."

Here are some questions to discuss with students:

- Is writing an inherited trait or a learned behavior?
- Why was it harder to write with your non-dominant hand? If you practiced, do you think you would improve?
- Why was it hard to leave the letter "i" un-dotted and the letter "t" un-crossed?
- What are some of your other learned behaviors? How do they help you?

Traits Bingo

Abstract

Students cross off or color bingo squares in response to questions about their traits. This activity is designed to be used as a review following An Inventory of My Traits, Generations of Traits, and A Tree of Genetic Traits.

Learning Objectives

- Students will inventory their own inherited traits.
- Students will compare traits to determine which are most and least common in the class.

Logistics

Time Required

- **Class Time:**
  20 minutes
- **Prep Time:**
  15 minutes to review activity and copy student pages

Materials

Copies of student pages, pen, pencil or crayon, PTC paper and hard candies if you haven't tested for this trait previously

Prior Knowledge Needed

Traits are inherited from parents; familiarity with traits listed on the bingo card is helpful

Appropriate For:

Primary Intermediate Secondary

Module
The Basics and Beyond: An Introduction to Heredity

Traits Bingo

Classroom Implementation

Note: One of the traits in this activity is the ability to taste PTC. If you have not already tested for this trait in a previous activity follow these steps before beginning:

- Give each student a piece of PTC paper and instruct them to place the paper on the tip of their tongue to see if they can taste the chemical. (PTC paper can be ordered inexpensively from: Ward's Natural Science (http://www.wardsci.com), Sargent Welch (www.sargentwelch.com), or Carolina Math and Science (www.carolina.com))
- Hand out a hard candy to each student, as the taste of PTC is bitter and slightly unpleasant.

Activity instructions:

- Distribute a Bingo card to each student and instruct them not to mark any squares until told to do so.
- Read the Bingo questions (page 3) one by one (in order or randomly), instructing students to mark the squares with an X or color them in.
- Continue to read Bingo questions (page 3) until a student obtains a bingo.

Quantities

Per Student

- One copy of page S-1
- (Optional) One strip of PTC paper if you have not tested for this trait.
- (Optional) Hard candy if testing for the ability to taste PTC.

Engaging idea:
You may also choose to use numbered cards or slips of paper for students to draw at random. When a particular number is drawn, read the corresponding question from the list of Bingo questions

Common Misconceptions

Students may think that they inherit physical traits from aunts, uncles, cousins and siblings because family members point out resemblances among relatives. In fact, physical traits are only inherited from parents, and, by extension, grandparents. Questions #5 and #6 aim to clear up this misconception should it exist.

Module
The Basics and Beyond: An Introduction to Heredity

Traits Bingo

Standards

U.S. National Science Education Standards

Grades 5-8:

- Content Standard C: Life Science - Reproduction and Heredity; every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to the other.

B. AAAS Benchmarks for Science Literacy

Grades 3-5:
The Living Environment
- Heredity
  - » some likenesses between children and parents, such as eye color in human beings, or fruit or flower color in plants, are inherited.

Grades 6-8:
The Human Organism
- Human Identity
  - » human beings have many similarities and differences.

Additional Resources

Visit the Learn.Genetics website to get more great resources like these!

Credits

Activity created by:
Molly Malone, Genetic Science Learning Center
Harmony Starr, Genetic Science Learning Center (illustrations)

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Module
The Basics and Beyond:
An Introduction to Heredity

Traits Bingo

Bingo Questions

You may ask the questions in order, at random, or have students draw numbers.

1. Color the square marked *I cross my right thumb over my left when I clasp my hands* if this describes you.
2. Color the square marked *Shared trait-Left* if you share a trait with the person sitting to your left.
3. Color the square marked *Least common trait* if you have a trait that not many people in the class share.
4. Color the square marked *Neighbor can not taste PTC* if you sit next to someone who can not taste PTC.
5. Color the square or squares naming the relatives from whom you **do not** inherit traits
6. Color the square or squares naming the relatives from whom you **do** inherit traits
7. Color the square marked *I have allergies* if you have this trait.
8. Color the square marked *Trait in common - Right* if you and your neighbor to the right share a common trait.
9. Find the two squares for tasting, or not tasting, PTC and color the one that applies to you.
10. Find the two squares describing earlobes and color the one that applies to you.
11. Color the square marked *Straight hairline* if you have this trait.
12. Color the square marked *Can not roll tongue* if you have this trait.
13. Color the square marked *I have a different trait than the person sitting next to me* if this describes you.
14. Find the two squares describing hair texture and color the one that applies to you.
15. Color the square marked *Freckles* if you have this trait.
16. Color the square marked *Dimples* if you have this trait.
17. Color the square marked *Cleft chin* if you have this trait.
18. Color the square marked *I cross my left thumb over my right when I clasp my hands* if this describes you.

Name _____

Date _____

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TRAITS BINGO

Color or mark with an "x" the squares below **when instructed to do so**
The square marked "free" is a free space

B	I	N	G	O
Aunt	I have allergies	Straight hairline	Freckles	Mother
I cross my right thumb over my left when I clasp my hands	Can not taste PTC	Curly hair	Neighbor can not taste PTC	Straight hair
Father	Grandmother	Free	Attached earlobes	Dimples
I have a different trait than the person sitting next to me	Cleft chin	Can taste PTC	Uncle	Can not roll tongue
Detached earlobes	Shared trait - Left	Trait in common - Right	I cross my left thumb over my right when I clasp my hands	Least common trait