

Teacher Guide: Generations of Traits

ACTIVITY OVERVIEW

Abstract:

In this hands-on activity students track and record the passage of colored “pom-pom traits” through three generations of ginger-bread people. In doing so, students learn that traits are passed from parents to offspring and that siblings may or may not receive the same traits from their parents.

Module:

Introduction to Heredity (Grades 5 - 7)

Key Concepts:

Traits are passed from parents to offspring; some traits are passed on while others are not. Siblings may or may not have the same combination of traits. An equal number of traits are passed on from each parent

Prior Knowledge Needed:

Traits are observable physical characteristics; traits are passed from parents to offspring

Materials:

Colored pom-poms (four different colors), crayons, cups, tape, student handouts

Appropriate For:

Ages: 10 - 12

USA grades: 5 - 7

Prep Time:

20 minutes

Class Time:

30 minutes

Activity Overview Web Address:

<http://gslc.genetics.utah.edu/teachers/tindex/overview.cfm?id=traitgenerations>

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I. PEDAGOGY

A. Learning Objectives

- Students will visualize the passage of traits from parents to offspring.
- Students will learn that siblings may or may not have an identical combination of traits.

B. Background Information

Basic information students need to understand:

Physical traits are observable characteristics. Traits are passed from parents to offspring. Both parents pass on an equal number of traits to each offspring. Traits are only inherited from parents (and by extension, grandparents), not from other family members.

More advanced information:

See the Background Information in *An Inventory of My Traits* activity. Also see “What is Inheritance?” in the *Tour of the Basics* on the Genetic Science Learning Center Website (see Additional Resources).

C. Teaching Strategies

1. Timeline

- One week before activity:
 - Obtain the required materials (see Detailed Materials List on page 3)
- One day before activity:
 - Bundle materials (see Materials Preparation Guide on page 3)
 - Make copies of student pages S-1, S-2 and S-3
- Day of activity:
 - Divide students into groups of 3 or 4
 - Distribute supply bundles - one bundle per group
 - Distribute student pages S-1, S-2 and S-3
 - Carry out the activity as per the instructions on student page S-1

2. Classroom Implementation

- Begin the class by reviewing what “traits” are. Ask students from whom they think they inherited their traits.

Teaching Note: Be sensitive to the fact that not all students know or have access to biological family members with whom they can compare their traits.

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- Divide students into groups of 3 or 4.
- Give each group a supply bundle (see Materials Preparation Guide, page 3)
- Instruct students to carry out the activity following the instructions on student page S-1.

Teaching Tip: Instruct students to mix the pom-poms in the cups with their hands each time before drawing them out. This will yield a more varied result.

Teaching Note: If the siblings in a group's family end up with the same combination of traits ask the group members questions that will lead them to think about the following:

- Human characteristics are determined by far more than six traits.
- It is possible to have six or more traits in common with another person, yet still maintain a unique appearance.
- Shared traits among siblings explains why some sibling groups look alike while others do not. It also explains why in some families, two or three siblings might resemble one another, while other siblings do not.

3. Extensions

- Follow this activity with *A Tree of Traits* and *Traits Bingo* activities (see Additional Resources).

4. Assessment Suggestions:

- Use students' answers to the questions on student page S-3 as an assessment.

5. Common Misconceptions:

- Students may think that they inherit traits from aunts, uncles, cousins and siblings because family members point out the resemblance between students and their relatives. However, traits can only be inherited from parents, and by extension, grandparents.

II. ADDITIONAL RESOURCES

A. Activity Resources - linked from the online Activity Overview:

<http://gslc.genetics.utah.edu/teachers/tindex/overview.cfm?id=traitgenerations>

- Website: "What is inheritance?" in the *Tour of the Basics*
- Teacher Guide: An Inventory of My Traits
- Teacher Guide: A Tree of Genetic Traits
- Teacher Guide: Traits Bingo

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III. MATERIALS

A. Detailed Materials List

(For 32 students – 8 groups of 4 students):

- 48 red pom-poms
- 48 brown pom-poms
- 48 green pom-poms
- 48 yellow pom-poms
- 48 plastic or paper cups
- Tape for labeling
- Writing implements (pens or pencils) – one per student
- Red, brown, green and yellow crayons – one set per student, pair or group
- Copies of student pages S-1, S-2, and S-3 – one per student

B. Materials Preparation Guide

Bundle materials as follows (one bundle per group):

- Six plastic or paper cups
- 6 red pom-poms
- 6 brown pom-poms
- 6 green pom-poms
- 6 yellow pom-poms
- Red, brown, green and yellow crayons – one set per student, pair or group
- Tape for labeling the cups

IV. STANDARDS

A. 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.
- Content Standard C: Life Science - Reproduction and Heredity; the characteristics of an organism can be described in terms of a combination of traits.

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.

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Grades 6-8:

- The Human Organism: Human Identity - human beings have many similarities and differences.

C. Utah Elementary Science Core Curriculum - Grade 5

Intended Learning Outcomes:

Students will be able to:

1. Use Science Process and Thinking Skills.
 - a. Observe simple objects, patterns, and events and report their observations.
 - d. Compare things, processes, and events.
4. Communicate Effectively Using Science Language and Reasoning.
 - b. Describe or explain observations carefully and report with pictures, sentences, and models.

Standard V: Students will understand that traits are passed from the parent organisms to their offspring, and that sometimes the offspring may possess variations of these traits that may help or hinder survival in a given environment.

Objective 1: Using supporting evidence, show that traits are transferred from a parent organism to its offspring.

- b. Identify similar physical traits of a parent organism and its offspring.

V. CREDITS

Activity created by:

Molly Malone, Genetic Science Learning Center

Harmony Starr, Genetic Science Learning Center (illustrations)

This activity was adapted from *“You, Me & Others”*, Biological Sciences Curriculum Study and March of Dimes Birth Defects (1995) (out of print).

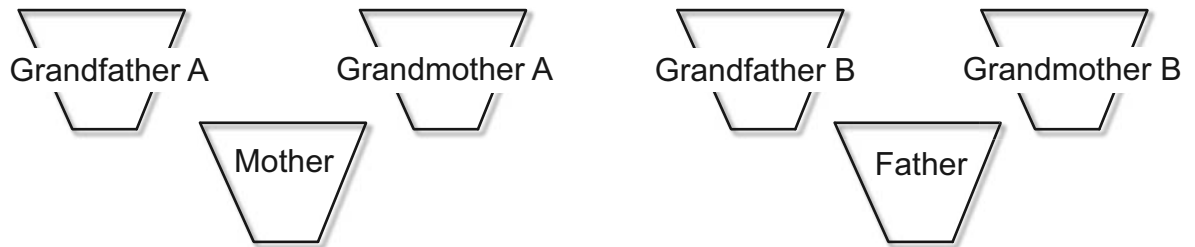
Funding:

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Generations of Traits - Instructions

In this activity you will track different traits (represented by colored pompoms) through three generations of “Ginger People”. You will need the Traits Through Generations Worksheet to follow along.

1. With a partner, label six cups as shown:



2. Arrange the cups as shown above and place six pom-poms in the cups, following the directions below:

Grandfather A - red

Grandfather B - yellow

Grandmother A - brown

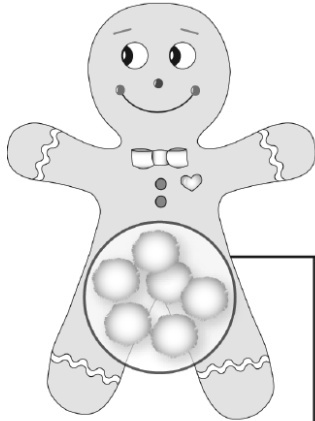
Grandmother B - green

The colored pom-poms are the traits that each of the grandparents have. Color the pom-pom pictures on the Generations of Traits Worksheet to show the traits for each grandparent.

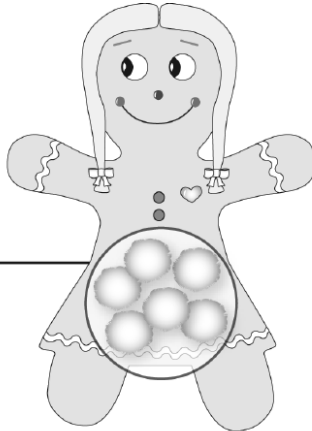
3. Close your eyes and pick three traits from Grandfather A and three traits from Grandmother A and place them in the cup labeled Mother. These are the traits that Mother inherited from her parents. Color the pom-pom picture on the worksheet to show the traits Mother has.
4. Close your eyes again and pick three traits from Grandfather B and three traits from Grandmother B, and place them in the cup labeled Father. These are the traits that Father inherited from his parents. Color the pom-pom picture on the worksheet to show the traits Father has.
5. Mother and Father have four children: Wilma, Fred, Bonnie, and Clyde. To determine the traits that Wilma will inherit from Mother and Father, close your eyes and take three pom-poms from Mother and three pom-poms from Father. Color the diagram to show the traits that Wilma inherited.
6. Next, return the traits that you took from Mother and Father (look at your diagram if you forget where each trait came from). Now, close your eyes again and choose the traits that Fred will inherit (3 from Mother, 3 from Father). Color the diagram to show Fred's traits.
7. Return the traits you took from mother and father and repeat the process to find the traits for Bonnie and then Clyde.
8. Answer the questions on the Generations of Traits Questions sheet.

Generations of Traits - Worksheet

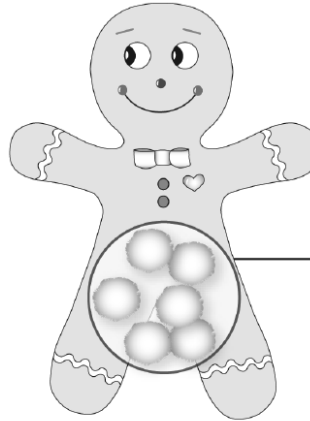
Grandfather A



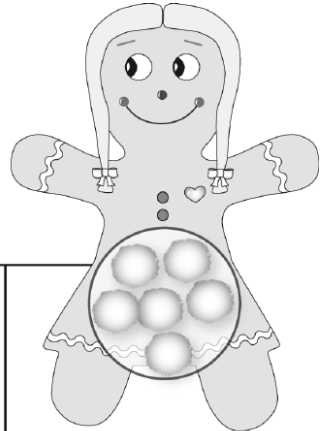
Grandmother A



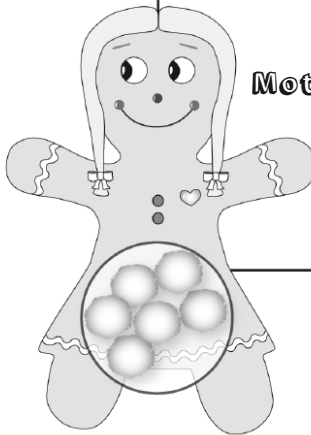
Grandfather B



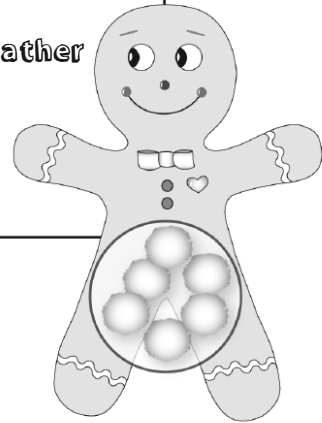
Grandmother B



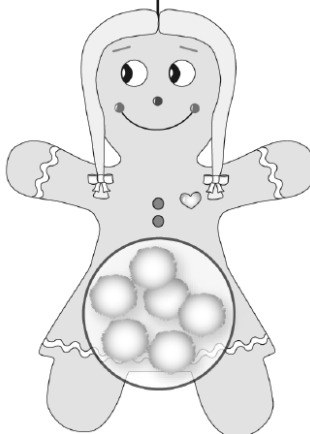
Mother



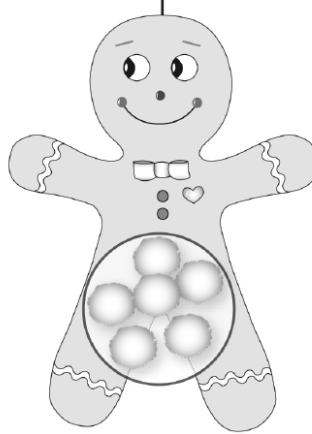
Father



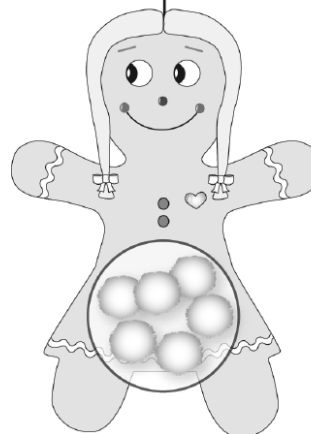
Wilma



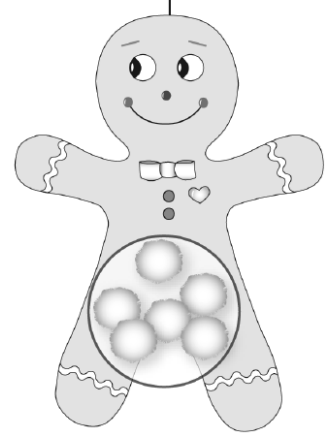
Fred



Bonnie



Clyde



Adapted from "You, Me & Others" (1995) BSCS and March of Dimes Birth Defects Foundation.

Generations of Traits - Questions

1. Would Wilma, Fred, Bonnie or Clyde look identical to (have the exact same traits as) their parents?
2. Does the same exact combination of traits happen over and over again in the children?
3. How many of the four children inherited a trait from each one of the grandparents?
4. Did all four children inherit exactly the same traits or is there some variation?
5. Is there a child that didn't inherit a particular trait? If so - which trait (color) was it?

Adapted from "You, Me & Others" (1995) BSCS and March of Dimes Birth Defects Foundation.