

# Generations of Traits

## Abstract

In this hands-on activity students track and record the passage of colored pom-pom “traits” through three generations of gingerbread people. Students observe that traits are passed from parents to offspring, and that siblings each receive a different combination of traits from their parents.

## Logistics

### Time Required

- ▶ **Class Time:**  
30 minutes
- ▶ **Prep Time:**  
30 minutes to review activity, make copies of student pages, and prepare materials

### Materials

Copies of student pages, colored pom-poms (four different colors), crayons, cups and tape

### Prior Knowledge Needed

None

### Appropriate For:

Ages: 10 - 13  
USA grades: 5 - 7

## Learning Objectives

- ▶ Traits are observable characteristics that are passed down from parent to child.
- ▶ An individual will have many traits they share in common with others, and more so with siblings and parents.
- ▶ An individual’s overall combination of traits makes them unique.
- ▶ An equal number of traits are passed on from each parent.

## Special Features You’ll Find Inside

- ▶ Engaging student pages that help students visualize and experience how traits are passed from parent to offspring.
- ▶ Spanish translation of the student instructions, worksheet and questions are included.

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## Classroom Implementation

### Activity instructions:

- Begin class by pointing out that every person in the class has a unique combination of “traits” or observable characteristics. Discuss some examples of traits (eye color, handedness, height, etc.).
- Invite students to consider why children often resemble their siblings and parents. Explain that these resemblances occur because traits are passed down from parent to child.
- Divide students into groups of 3 or 4. Give each group a set of materials. Instruct students to carry out the activity following the instructions on student page S-1.
- Suggest that students close their eyes and mix the pom-poms with their hands each time before drawing them out. This will yield a more random and varied result.

### Discussion Points:

- If the siblings in a group’s family end up with the same combination of traits, remind students that 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.
- Because siblings inherit traits from the same parents they often look alike. However, a child randomly inherits half of his traits from each parent. As a result, siblings each inherit a different combination of traits.

## Standards

### U.S. National Science Education Standards

#### Grades 5-8:

#### Content Standard C: 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 another.
- The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.
- A new individual receives genetic information from its mother and its father. Sexually produced offspring never are identical to either of their parents.

## Quantities

### Per Student

- ▶ One copy of student pages S-1 to S-3

### Per Group of 3 or 4

- ▶ Six plastic cups, 24 pom-poms (6 brown, 6 green, 6 yellow, 6 red), crayons (brown, green, yellow and red), tape and marker for labeling the cups

## Common Misconceptions

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

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## 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. For offspring to resemble their parents, there must be a reliable way to transfer information from one generation to the next.

### Grades 6-8:

The Living Environment: Heredity - In some kinds of organisms, all the genes come from a single parent, whereas in organisms that have sexes, typically half of the genes come from each parent.

## Credits

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## Additional Resources

Visit the Teach.Genetics web site to get more great resources like this one!

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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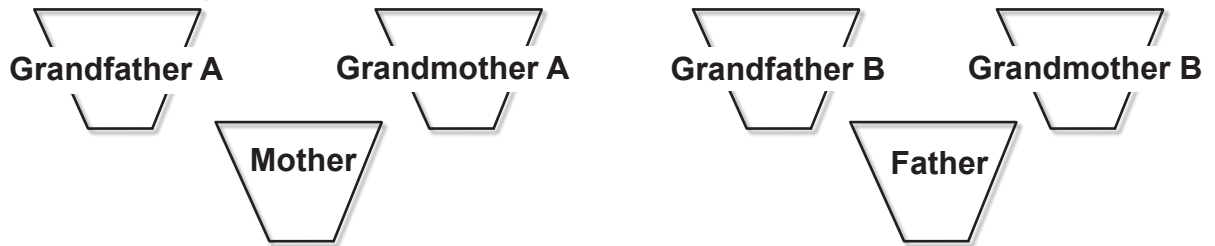
Grant U33MC00157 from the Health Resources and Services Administration, Maternal and Child Health Bureau, Genetic Services Branch. Partners in the Consumer Genetics Education Network (CGEN) include HRSA, March of Dimes, Dominican Women’s Development Center, Charles B. Wang Community Health Center, Genetic Science Learning Center at University of Utah, Utah Department of Health and the National Human Genome Center at Howard University.

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## Generations of Traits - Instructions

In this activity you will track different traits (represented by colored pom-poms) through three generations of "Ginger People". You will need the Generations of Traits Worksheet to follow along.

1. Your partner and you have six labeled cups as shown.



2. Arrange the cups as shown above. Check to make sure that each cup is set up with six pom-poms in each, following the directions below:

Grandfather A - red

Grandfather B - white

Grandmother A - black

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: Mary, George, Elizabeth and Carl. To determine the traits that Mary 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 Mary 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 George will inherit (3 from Mother, 3 from Father). Color the diagram to show George's traits.
7. Return the traits you took from Mother and Father and repeat the process to find the traits for Elizabeth and then Carl.
8. Answer the questions on the Generations of Traits Questions sheet.

Name \_\_\_\_\_

Date \_\_\_\_\_

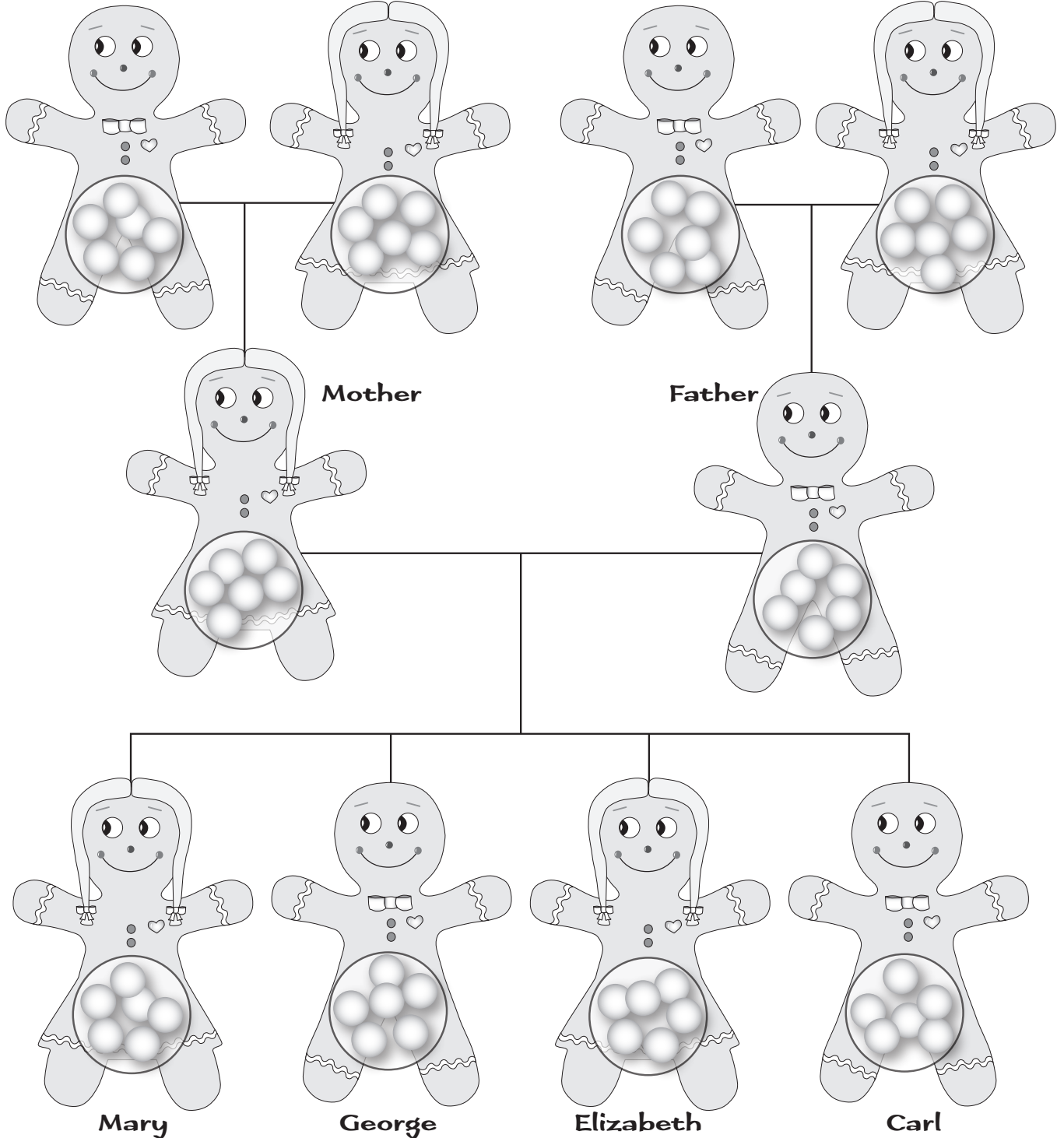
# Generations of Traits - Worksheet

Grandfather A

Grandmother A

Grandfather B

Grandmother B



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

Name \_\_\_\_\_

Date \_\_\_\_\_

## Generations of Traits - Questions

1. Would Mary, George, Elizabeth and Carl look identical to (have the same traits as) their parents?

2. Did all four children inherit exactly the same traits or is there some variation?

3. How many of the four children inherited a trait from each one of the grandparents?

4. 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.

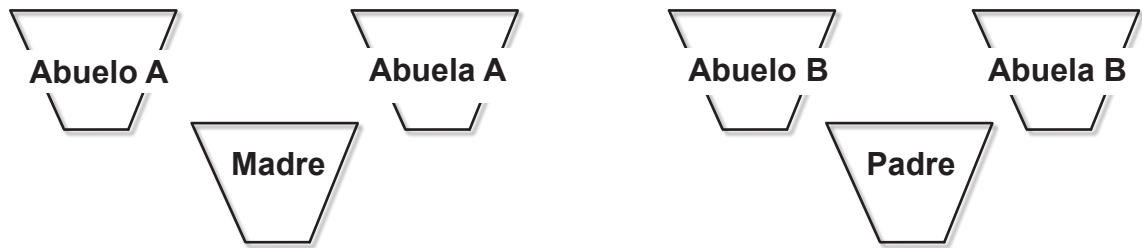
Name \_\_\_\_\_

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## Rasgos de las Generaciones - Instrucciones

**En esta actividad vas a seguir diferentes rasgos (representados por pompones de colores) a través de tres generaciones. Vas a necesitar el diagrama de las Generaciones de los Rasgos, para poder continuar.**

1. Con un compañero etiqueta seis vasos como se muestra en la siguiente figura:



2. Coloca los vasos como se muestra arriba y mete seis pompones en cada uno de ellos, siguiendo las siguientes instrucciones:

Abuelo A – Rojo

Abuelo B – Amarillo

Abuela A – Café

Abuela B – Verde

Los pompones de colores son los rasgos que tienen cada uno de estos abuelos. Colorea los dibujos de los pompones en el diagrama de los Rasgos de las Generaciones para mostrar los rasgos de cada uno de los abuelos.

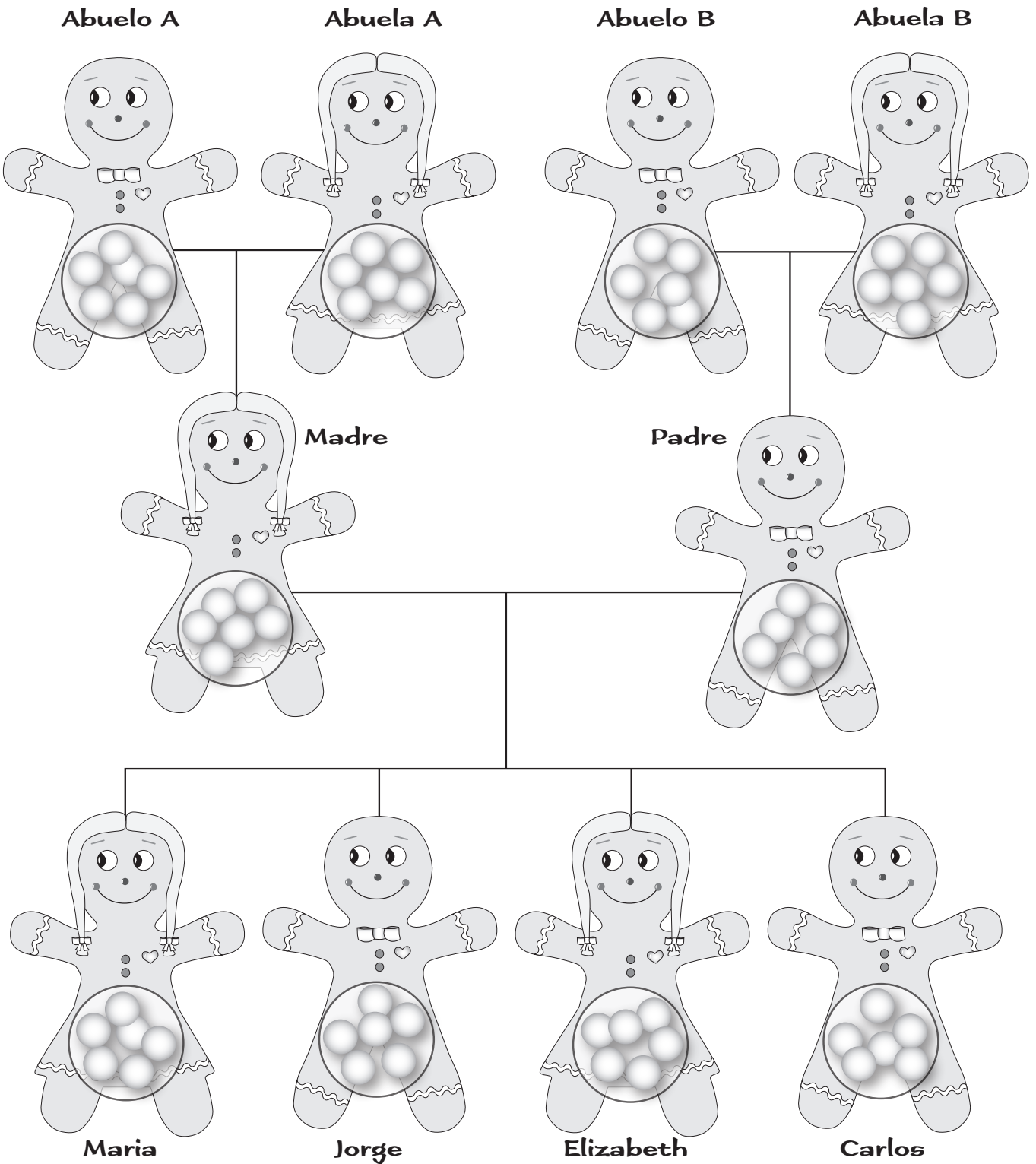
3. Cierra tus ojos y escoge tres rasgos del Abuelo A y tres rasgos de la Abuela A y colócalos en el vaso que dice Madre. Estos son los rasgos que la Madre heredó de sus padres. Colorea la figura de los pompones en el diagrama para mostrar los rasgos que tiene la Madre.
4. Cierra tus ojos de nuevo y escoge tres rasgos del Abuelo B y tres rasgos de la Abuela B y colócalos en el vaso que dice Padre. Estos son los rasgos que el Padre heredó de sus padres. Colorea la figura de los pompones en la hoja de datos para mostrar los rasgos que tiene el Padre.
5. La Madre y el Padre tienen cuatro hijos: María, Jorge, Elizabeth y Carlos. Para determinar que rasgos son los que María va a heredar de su Padre y Madre, cierra los ojos y toma tres pompones de la Madre y tres pompones del Padre. Colorea la figura en el diagrama para mostrar los rasgos que María heredó de sus padres.
6. Después, devuelve los rasgos que tomaste de la Madre y del Padre. (Mira en tu diagrama si olvidaste de donde viene cada rasgo.) Ahora, cierra los ojos y escoge los rasgos que Jorge va a heredar (tres de la Madre y tres del Padre). Colorea el diagrama para mostrar los rasgos de Jorge.
7. Regresa los rasgos que tomaste de la Madre y el Padre. Repite el proceso para encontrar los rasgos de Elizabeth y después los de Carlos.
8. Responde a las preguntas en la hoja de preguntas de los Rasgos de las Generaciones.



Name \_\_\_\_\_

Date \_\_\_\_\_

## Rasgos de las Generaciones - Diagrama



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



Name \_\_\_\_\_

Date \_\_\_\_\_

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## Rasgos de las Generaciones - Preguntas

1. ¿Tendrán Maria, Jorge, Elizabeth y Carlos los mismos rasgos que sus padres?
2. ¿Los niños heredaron exactamente la misma combinación de rasgos? Existen variaciones?
3. ¿Cuántos de los niños heredaron un rasgo proveniente de sus abuelos?
4. ¿Alguno de los niños no heredó ningun rasgos en particular? Si esto ocurrió ¿cuál fue la variación?

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