Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Student Exploration:** **Inheritance**

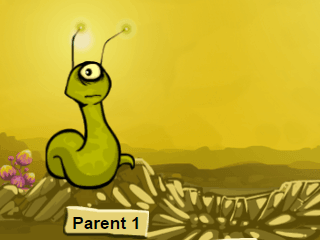
**Vocabulary:** acquired trait, asexual reproduction, clone, codominant traits, dominant trait, inherit, offspring, recessive trait, sexual reproduction, trait

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Johnny and Isabelle are a young couple expecting their first child. Both have blue eyes, tattoos, and green hair. Which features do you think their child is most likely to have?
   * Blue eyes
   * Tattoos
   * Green hair
2. Features like eye color, skin tone, height, and hair color are called **traits**. What traits do you think children **inherit**, or receive, from their parents?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Gizmo Warm-up**

In the *Inheritance* Gizmo you can create and breed aliens on an imaginary planet. Select **Asexual reproduction**. During **asexual reproduction**, a single parent produces **offspring** (children).

1. Click **Create alien** and create your own alien. Describe its traits in the **Parent** row of the table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Alien** | **Body type** | **Skin Color** | **Antenna shape** | **Tattoo** |
| Parent |  |  |  |  |
| Offspring |  |  |  |  |

1. Drag the parent over to the **Parent 1** space and press **Reproduce**. Fill in the **Offspring** traits on the table above. What traits appear to be inherited from the parent?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Because this offspring inherits its traits from one parent, it is called a **clone**.

|  |  |  |
| --- | --- | --- |
| **Activity A:**  **Inherited traits** | Get the Gizmo ready:   * Select **Sexual reproduction**. * Drop all remaining aliens (if any) in the **Exit** hole. | Capture_2 |

**Question: Are all parental traits inherited by offspring?**

1. Observe: In **sexual reproduction**, two parents pass traits to the offspring. Create and breed a variety of aliens. Record your observations on a separate sheet of paper.
2. Form a hypothesis: Which traits do you think are passed down from alien parents to their offspring, and which traits are not? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Experiment: Set the **Food supply** to **2 bushes**. Create two identical parents with thick bodies, green skin, curly antennas, and triangle tattoos. Make two offspring and record their traits in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Offspring** | **Body type** | **Skin Color** | **Antenna shape** | **Tattoo** |
| Offspring 1 |  |  |  |  |
| Offspring 2 |  |  |  |  |

1. Analyze: Compare the offspring traits to the parent traits.
   * 1. Which traits were passed from parents to offspring? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Which traits were *not* passed down? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Traits that are not passed down (not inherited) are called **acquired traits**.

1. Investigate further: Create offspring with a few different levels of **Food supply**. How does food supply affect the body type of offspring?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Think and discuss: Suppose a human child had a mother with dyed-pink hair and a father who was missing a finger (lost in an accident). Would the child inherit these traits? Explain.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **Activity B:**  **Skin color** | Get the Gizmo ready:   * Clear all parents and offspring from the Gizmo by dropping them into the **Exit** hole. * Create a green alien and a pink alien. | Capture_3 |

**Question: How is alien skin color inherited?**

1. Predict: What do you think the offspring of a green alien and pink alien will look like? \_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Experiment: Test your prediction with the Gizmo. What did you find? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

When offspring show a mixture of parent traits, the traits are called **codominant traits**.

1. Predict: What do you think will happen when you breed two green-and-pink spotted aliens? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Experiment: Follow the steps below. (You may have already done the first step or two.)
   * Place a green alien and a pink alien in the locations for **Parent 1** and **Parent 2**.
   * Breed these parents twice. Drag both offspring to the spaces below the **Nest**.
   * Drag the two green-and-pink offspring up to become the new **Parent 1** and **Parent 2**.
   * Breed these aliens 10 times. Record how many times each skin color occurred in their offspring. (For example, if there were 2 green offspring, write “2” below “green.”)

|  |  |  |  |
| --- | --- | --- | --- |
| **Skin color** | Green | Green and pink | Pink |
| **Number of offspring** |  |  |  |

1. Analyze: Look at the results of your experiment.
   * 1. What kind of skin did most of the offspring have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Did *all* of the offspring have green and pink skin? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Think and discuss: For a codominant trait, do the offspring of identical parents always look like the parents? Explain your answer.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **Activity C:**  **Antenna shape** | Get the Gizmo ready:   * Clear all aliens by dropping them into the **Exit** hole. * Create two aliens – one with straight antenna and one with curly antenna. | Capture_4 |

**Question: How is alien antenna shape inherited?**

1. Predict: What do you think will happen when you breed an alien with straight antenna to an alien with curly antenna? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Experiment: Test your prediction using the Gizmo. Create at least 5 offspring. What did you notice? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Analyze: Sometimes when two traits are combined, one is a **dominant trait** and the other is a **recessive trait**. If both traits are present, only the dominant trait is seen in the offspring.
   1. Which trait is dominant, straight antenna or curly? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Which trait is recessive? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Investigate further: Take two of the straight-antenna offspring and breed them together to produce 10 new offspring. Record the antenna type of each offspring.
   1. What happened? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Did the recessive trait disappear? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. How can a trait skip a generation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Draw conclusions: For a dominant/recessive trait, do the offspring of identical parents always look like the parents? Explain. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Compare: How do the offspring of two parents that reproduce sexually differ from the offspring of a single parent that reproduces asexually?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_