# **Engage: Tra**it Tales: How Mendel's Pea **Plants Reve**aled the Secrets of Heredity

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#### **Objective:**

In this activity, you will explore Gregor Mendel's experiments with pea plants to understand how traits are passed from parents to offspring. By creating a story and a model, you will learn to identify dominant and recessive traits and explain why some traits appear more frequently than others.

#### Background:

## The Tale of Gregor Mendel's Pea Plants

Once upon a time, in a peaceful garden, lived a

scientist named Gregor Mendel who loved studying plants. Mendel was especially interested in his pea plants because they came in many different traits, such as seed color, seed shape, pod color, and plant height. He noticed something interesting: some traits seemed to show up more often than others. For example, tall pea plants were much more common than short ones.

Mendel wondered, "Why do some traits, like tall height, appear more frequently than others?" He decided to investigate. He found that the reason tall height is more common is that the tall trait is **dominant**. This means that if a pea plant has at least one tall trait, it will always be tall. In contrast, the short trait is **recessive**, which means it only appears if a plant has two copies of the short trait.

So, why do some traits show up more often? Mendel discovered that traits like tall height appear more frequently because they are dominant. Dominant traits "hide" recessive traits, so if a plant has one dominant tall trait and one recessive short trait, the plant will be tall. The dominant trait is stronger and "overpowers" the recessive one.





Mendel figured out which traits were dominant or recessive by carefully crossing pea plants with different traits. He grew many generations of plants and observed the results. Through his experiments, Mendel noticed patterns: when he crossed two plants with a dominant trait, like tall height, most of the offspring were also tall. However, when he crossed two plants with the recessive trait, like short height, only the short trait appeared in the offspring.

The way Mendel found out which traits were dominant or recessive was by counting how often each trait appeared in the offspring. He saw that the dominant traits always showed up more often. For example, when he crossed plants with purple flowers (dominant) and white flowers (recessive), most of the offspring had purple flowers, confirming that purple is dominant and white is recessive.

In summary, Mendel knew which traits were dominant because they appeared more frequently in the offspring, and he identified which were recessive because they only appeared when both parents contributed recessive traits. By carefully observing and counting, Mendel unlocked the secrets of inheritance and the patterns of traits in his pea plants.

Here are the traits Mendel studied in pea plants:

- Seed Color:
  - Yellow (Dominant)
  - Green (Recessive)
- Seed Shape:
  - Round (Dominant)
  - Wrinkled (Recessive)
- Pod Color:
  - Green (Dominant)
  - Yellow (Recessive)
- Pod Shape:
  - Smooth (Dominant)
  - Constricted (Recessive)

- Flower Color:
  - Purple (Dominant)
  - White (Recessive)
- Flower Position:
  - Along the Stem (Dominant)
  - At the End of the Stem (Recessive)
- Plant Height:
  - Tall (Dominant)
  - Short (Recessive)

Mendel discovered that some traits, like tall plants, are **dominant**. This means they show up more often. Other traits, like short plants, are **recessive**. They only show up if a plant has two copies of the recessive trait.

Name:			

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

#### Your Task:

In your group, pretend you are Gregor Mendel. Work together to figure out why some traits show up more often than others. Then, create a **story** to explain why this happens.

#### Step 1:

Answer these questions with your group:

- Why do some traits (like tall height) show up more often than others?
  - "Some traits show up more often because \_\_."
  - "Traits like tall height appear more frequently because \_\_."
  - "The reason tall height is more common is \_\_."
  - "Traits that show up more often, like tall height, are \_\_ because \_\_."
  - How did Mendel figure out which traits were dominant or recessive?
    - "Mendel figured out which traits were dominant or recessive by \_\_."
    - $\circ$   $\;$  "Mendel discovered dominant and recessive traits by \_\_."
    - $\circ$  "The way Mendel found out which traits were dominant or recessive was \_\_."
    - "Mendel knew which traits were dominant because \_\_ and which were recessive because \_\_."

#### Step 2:

Create a **story** to explain what happens when a fictional organism with different traits are crossed. You can give the traits personalities. Maybe the dominant traits are "bossy," and the recessive traits

Name:			

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

are "shy." Be sure to identify which trait is dominant and recessive. Explain why the offspring that were produced had certain traits.

#### Sentence Starters for Your Story:

- "Once upon a time, there were \_\_\_\_\_. One had \_\_\_\_\_, and the other had \_\_\_\_\_. When they crossed, the \_\_\_\_\_were \_\_."
- "The \_\_\_\_\_\_ trait only showed up when \_\_."
- "The bossy \_\_\_\_\_ trait always showed up because \_\_."

#### Step 3:

Draw a model (a picture) showing how traits are passed down from parent plants to their offspring. Try to show why dominant traits appear more often than recessive traits.



#### Sentence Starters for Your Model:

- "In our drawing, the tall pea plant is \_\_ because \_\_."
- "We think the purple flower trait appears more often because \_\_."

#### **Group Reflection:**

- Did all groups have the same ideas?
- What do you think Mendel learned from his experiments with pea plants?

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## **Teacher Instructions**

#### Grade Level:

#### 9th Grade Biology (6th-grade reading level for accessibility)

#### **Objective:**

Promote curiosity by encouraging students to explore why specific traits appear in offspring using Mendel's pea plant experiments. Students will develop an initial understanding of dominant and recessive traits and construct inheritance models.

#### **Materials Needed:**

- Visual aids or props representing different pea plant traits tested by Mendel:
  - Seed color (yellow or green)
  - Seed shape (round or wrinkled)
  - Pod color (green or yellow)
  - Pod shape (smooth or constricted)
  - Flower color (purple or white)

- Flower position (along the stem or at the end of the stem)
- Plant height (tall or short)
- Storytelling sheets (included in the student doc)
- Chart paper or whiteboard for group models

## Duration:

One class period (60 minutes)

## Activity Outline:

## 1. Introduction (10 minutes):

Begin by introducing Gregor Mendel and his famous experiments with pea plants. Show visuals or enact the experiment by demonstrating how Mendel crossed pea plants with different traits. Explain that Mendel tested seven characteristics in pea plants, each with two possible traits:

- Seed color: yellow (dominant) or green (recessive)
- Seed shape: round (dominant) or wrinkled (recessive)
- Pod color: green (dominant) or yellow (recessive)
- Pod shape: smooth (dominant) or constricted (recessive)
- Flower color: purple (dominant) or white (recessive)
- Flower position: along the stem (dominant) or at the end of the stem (recessive)
- Plant height: tall (dominant) or short (recessive)
- Use props or illustrations to show how crossing two plants with different traits (like a tall plant and a short plant) led Mendel to his discovery of dominant and recessive traits.

## Ask the class:

- $\circ$   $\;$  "Why did the tall plants show up more often in the first generation?"
- $\circ$   $\;$  "What do you think could be happening inside the plants to cause this?"

## 3. Group Work (30 minutes):

• Break students into small groups.

- Each group should pretend they are Mendel and work together to discuss:
  "Why did some traits, like tall height or purple flowers, appear more frequently?"
  and "How did Mendel figure this out?"
- Have students create stories to explain how these traits behave (traits can be characters in their stories, where dominant traits are "bossy" and recessive traits are "shy").
- Groups should also sketch an initial model showing how traits are passed down from parent plants to offspring.

#### 4. Sharing Models (15 minutes):

- Groups will present their stories and models to the class.
- Encourage students to compare and contrast their models. Lead them toward understanding that dominant traits tend to mask recessive traits.

#### 5. Wrap-Up (5 minutes):

- Summarize the key points by discussing how Mendel used math and ratios to demonstrate that traits are passed down in predictable patterns.
- Prepare students for the next lesson, where they will explore Punnett squares and how traits are inherited.

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