Mushroom Detective: Deconstructing a Club Fungus

Materials Needed:

- One or two common grocery store mushrooms with visible gills (e.g., Portobello, Cremini, or Shiitake)
- A sheet of white paper and a sheet of dark-colored paper (like black or blue construction paper)
- A plastic knife or butter knife for dissection
- A magnifying glass (optional, but highly recommended)
- A bowl or glass to cover the mushroom cap
- A pen or pencil and a small piece of paper or sticky note for labeling

Learning Objectives (9th Grade Biology)

By the end of this 30-minute lesson, the student will be able to:

- Identify the primary external structures of a club fungus (cap, gills, stipe) through hands-on dissection.
- Create a mushroom spore print and formulate a hypothesis about its function in fungal reproduction.
- Explain the ecological role of a mushroom as a decomposer by connecting its structure to its function in nature.

Alignment with Standards

This lesson aligns with Next Generation Science Standards (NGSS), particularly **HS-LS2-8**, which involves evaluating evidence for the role of group behavior on individual and species' chances to survive and reproduce. Here, we focus on the reproductive strategy (spore dispersal) of fungi and their role in an ecosystem as decomposers.

Lesson Procedure (Approx. 25-30 minutes)

Part 1: The Investigation Begins - External Anatomy (10 minutes)

1. **Introduction (2 min):** Present the mushroom as a "mystery organism." Ask the student: "This is the 'fruiting body' of a much larger organism that lives underground. What do you think its job is? Our mission today is to dissect it to find clues about how it lives and reproduces."
2. **Dissection (8 min):**
    - Guide the student to carefully observe the whole mushroom. Have them describe its texture, smell, and parts.
    - Identify the **Cap** (the top part). Ask: "What purpose might this 'umbrella' shape serve?" (Answer: To protect the gills and spores from rain/sun).
    - Identify the **Stipe** (the stalk). Ask: "Why does it need to be elevated off the ground?" (Answer: To better release its spores into the wind).
    - Carefully use the plastic knife to separate the cap from the stipe.
    - Examine the underside of the cap to find the **Gills**. Use a magnifying glass if available. Ask the key detective question: "These gills create a huge amount of surface area. What

important 'evidence' do you think might be produced or held here?" (Guide them toward the idea of seeds, or spores).
    - Have the student sketch the mushroom cross-section and label the three main parts they identified: Cap, Gills, Stipe.

Part 2: Dusting for Prints - Spore Collection (15 minutes total, with 5 min active time)

1. **Set-Up (5 min):**
    - Instruct the student to take the detached mushroom cap and place it gill-side down on a piece of paper. For best results, use the white paper for a dark mushroom and dark paper for a light mushroom, or place it half-on-half to ensure the print shows.
    - Ask the student to write a hypothesis: "I predict that over a short time, the mushroom cap will..." (e.g., "...release a powder that is used for making new mushrooms.")
    - Cover the cap with a bowl or glass. This prevents air currents from disturbing the spores and helps maintain humidity.
    - **Important Note:** This step is for starting the print. It will not be fully developed in 30 minutes, but the lesson can be completed while it develops. You will check the results later in the day or the next morning.
2. **Analysis and Connection (While waiting, 10 min):**
    - Explain that the "dust" they are collecting is made of millions of microscopic spores. Each spore can potentially grow into a new fungus if it lands in a suitable environment.
    - Discuss the mushroom's role. Ask: "If you were walking in a forest, where would you most likely find mushrooms growing?" (On dead logs, rotting leaves, damp soil). "Based on that, what do you think their job is in the ecosystem?" (They are decomposers, breaking down dead organic material).
    - Connect this role to their structure: The main body of the fungus (the mycelium, a network of threads) is inside the log or soil, digesting it. The mushroom is just the temporary reproductive structure that pops up to release spores and spread the fungus.

Assessment (Final 5 minutes)

- **Formative Check:** Review the student's labeled diagram of the mushroom. Discuss their hypothesis for the spore print. Are their ideas logical based on their observations?
- **Summative "Exit" Question:** Pose a creative application scenario: "You've just proven that this mushroom's job is to decompose things and spread its spores. As a biologist, explain to a friend in two sentences why it's a terrible idea to build a treehouse using a fallen, dead log you found in a damp forest." (Look for an answer connecting the log being food for fungi, leading to rot and structural weakness).

Differentiation and Extension

- **For Support:** Provide a pre-labeled diagram for the student to reference if they have trouble identifying the parts independently. Ask more direct questions like, "Do you see the lines under the cap? Those are the gills."
- **For Extension (If time permits or for further study):**
    - After the spore print is complete (several hours later), carefully lift the cap. Have the student observe the intricate pattern. They can spray it with a light coat of hairspray or artist's fixative to preserve it.
    - Research the difference between club fungi (Basidiomycota, which produce spores on gills) and sac fungi (Ascomycota, which hold spores in a sac). Morels are a great example of an

edible sac fungus.
- Investigate the vast underground mycelial networks and how they act as a "wood wide web," transferring nutrients between trees.