SI Biology - Full Discipline Demo

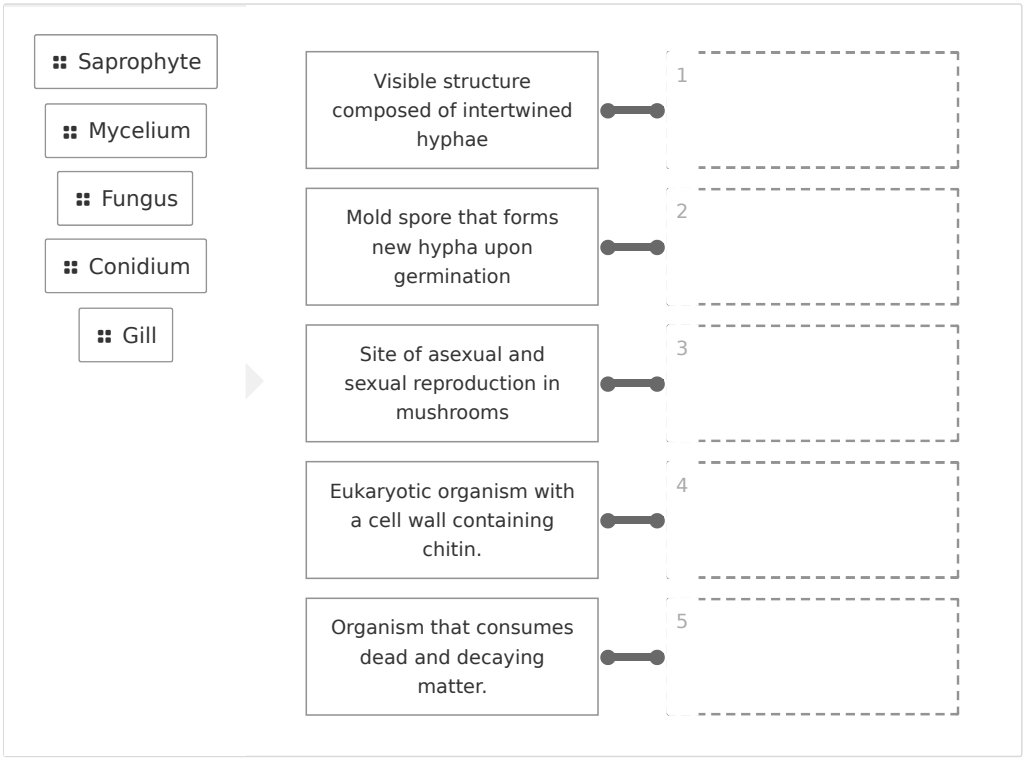
Fungi - Digital

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Biology - Full Discipline Demo
Course	SI Biology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

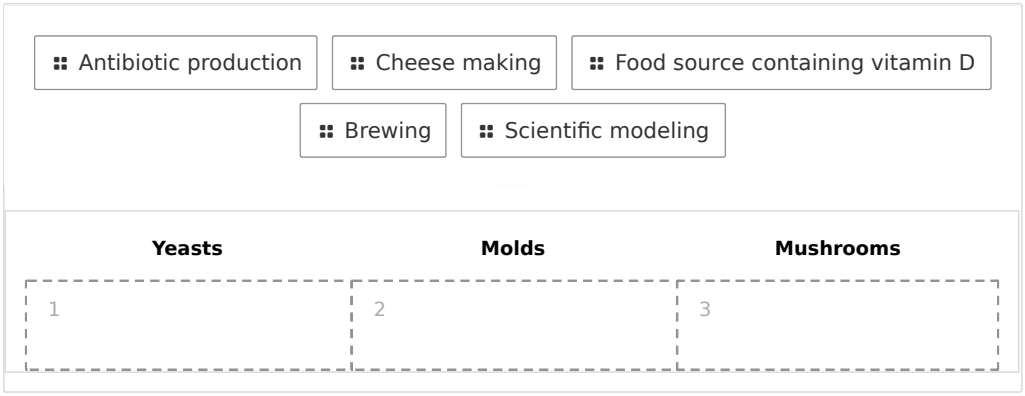
Match each term with the best description.



Correct answers:

1 Mycelium 2 Conidium 3 Gill 4 Fungus 5 Saprophyte

Identify each industrial application as related to yeasts, molds, or mushrooms.



Correct answers:

1 Brewing Scientific modeling

2 Antibiotic production Cheese making

3 Food source containing vitamin D

Exploration

_____ are tubular structures of connected cells that form all multicellular fungi.

- Chitin
- Hyphae ✔
- Lignin
- Septa

Budding is a form of sexual reproduction in yeasts.

- True
- False ✔

_____ germinate to form hyphae in molds.

- [x] Conidia
- [ ] Conidiophores
- [ ] Buds
- [ ] Mycelium

All molds are harmful to humans.

- [ ] True
- [x] False

The _____ of a mushroom covers and protects the gills.

- [x] cap
- [ ] stem
- [ ] volva
- [ ] annulus

Exercise 1

Describe three traits shared between yeasts and molds.

Yeasts and molds are fungi, which contain chitin in their cell walls. Both yeasts and molds consist of eukaryotic cells with membrane-bound organelles. Both yeasts and molds are heterotrophs that obtain nutrients from other organisms. Both yeast and molds reproduce asexually.

Describe the process of budding in yeasts. How was this observed on the Yeast slide? Reference Photo 1 in your explanation.

During budding, a small daughter cell forms on the surface of the parent cell. See Figure 2. The nucleus of the parent cell then divides by mitosis, with one half migrating into the bud. The daughter cell continues to grow until it separates from the parent. Daughter cells are smaller than parent cells upon separation and continue to grow until maturity. Budding was observed on the yeast slide as cells with small growths as recorded in Photo 1. Also, some cells were smaller than others, representing recently separated daughter cells that had not yet matured.

Describe asexual reproduction in molds. How was this observed on the Penicillium slide? Reference Photo 2 in your explanation.

Most molds reproduce asexually by forming spores. The spores, called conidia, are located at the ends of aerial hyphal structures known as conidiophores. When dispersed, conidia that encounter favorable environmental conditions germinate and develop into new hyphae. Conidiophores were observed on the *Penicillium* slide as tiny brush structures as recorded in Photo 2. Conidia appeared as oval grains in the labeled photo.

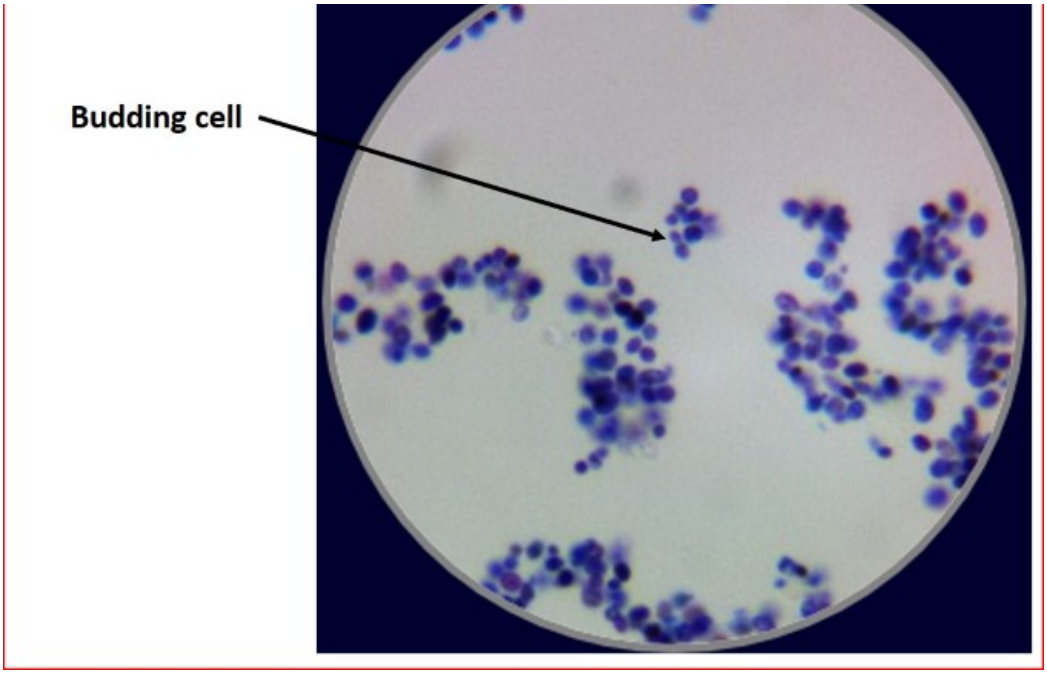
How are yeasts and molds used in modern industry?

Yeasts are used in the baking and brewing industries to make bread and alcohol. Molds, such as ***Penicillium*** are used to make cheese, cured meats, and produce compounds used in antibiotics and cancer treatments.

Data Table 1: Fungi Structures and Functions
(SAMPLE ANSWER BELOW)

Structure	Description
Hyphae	Long, tubular structures of connected cells that form the structure of multicellular fungi.
Bud	Projection from parent cell that will become daughter cell in yeast asexual reproduction.
Conidiophore	Aerial hyphal structures that produce spores.
Conidia	Mold spores produced during asexual reproduction that will germinate to form new hyphae.

Photo 1: Yeast, Whole Mount Labeled
(SAMPLE ANSWER BELOW)



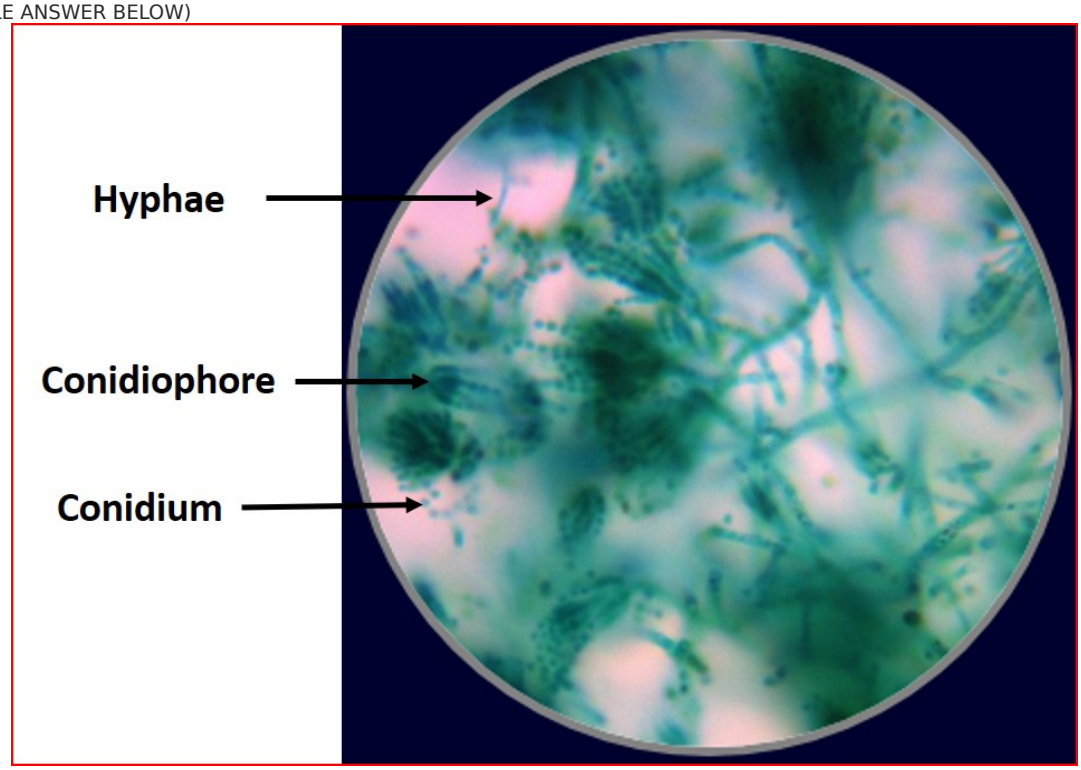
Data Table 2: Total Magnification of Slides

(SAMPLE ANSWER BELOW)

Slide	Magnification	Comments
Yeast, Whole Mount	600x	Students should only provide answers in this section if they were unable to identify structures.
Penicillium with	600x	

Conidia		

Photo 2: Penicillium With Conidia Labeled
(SAMPLE ANSWER BELOW)



Exercise 2

How do both sexual and asexual reproduction occur in mushrooms? Which labeled structure in Photo 3 is the site for each of these reproductive modes?

Sexual reproduction occurs in the gills of the mushroom via conjunction when the nuclei of two haploid hyphal strains fuse to form a diploid zygote. The zygote then undergoes meiosis to form four haploid spores. The spores begin the asexual phase of the fungus and are released from the gills and disperse to germinate into new hyphae when encountering favorable conditions. The gills labeled in Photo 3 are the site for both sexual and asexual reproduction.

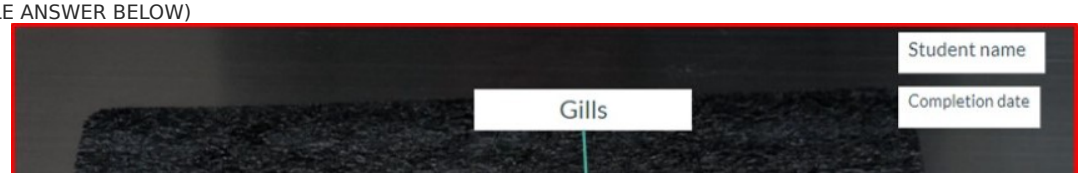
Are the stem and cap of the mushroom composed of different tissues than the below-ground structures of a fungus? Explain your answer by describing how mushrooms are formed.

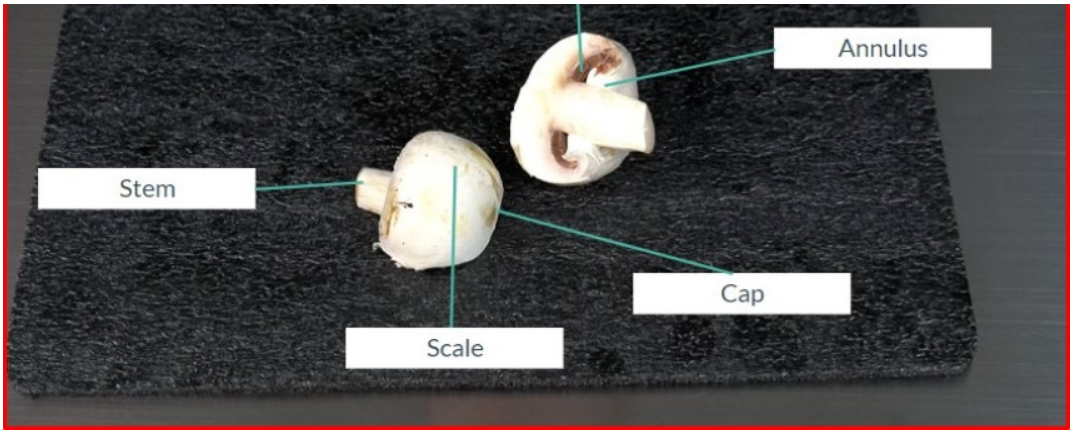
No, the mushroom is composed of hyphae just as is the below ground portion of the fungus. Mushrooms are formed when hyphae from different individuals of a species contact one another. The hyphal strands then align grow to form the fruiting body.

Data Table 3: Mushroom Structures and Functions
(SAMPLE ANSWER BELOW)

Structure	Description
Gills	Rib-like extensions under the cap that serve as sites for conjugation and spore production.
Annulus	Ring-like structure on stem of mature fruiting bodies that represents the remnants of the veil that covered the immature gills.
Stem	Stalk that supports the cap of the fruiting body. Composed of hyphae.
Cap	Protects and supports the gills of the fruiting body
Scales	Rough patches of tissue on the surface of the cap that are remnants of the veil that surrounded the developing fruiting body.

Photo 3: Dissected Mushroom Labeled
(SAMPLE ANSWER BELOW)





Competency Review

Fungi include both unicellular and multicellular organisms with cell walls containing chitin.

- True ✔
- False

Many types of fungi are classified as _____ because they consume dead and decaying organic matter.

- autotrophs
- chemoautotrophs
- heterotrophs
- saprophytes ✔

Yeasts reproduce asexually by _____.

- budding ✔
- conidia
- conjunction
- meiosis

_____ produce spores in molds.

- Daughter cells
- Conidiophores ✔
- Gills
- Mycelium

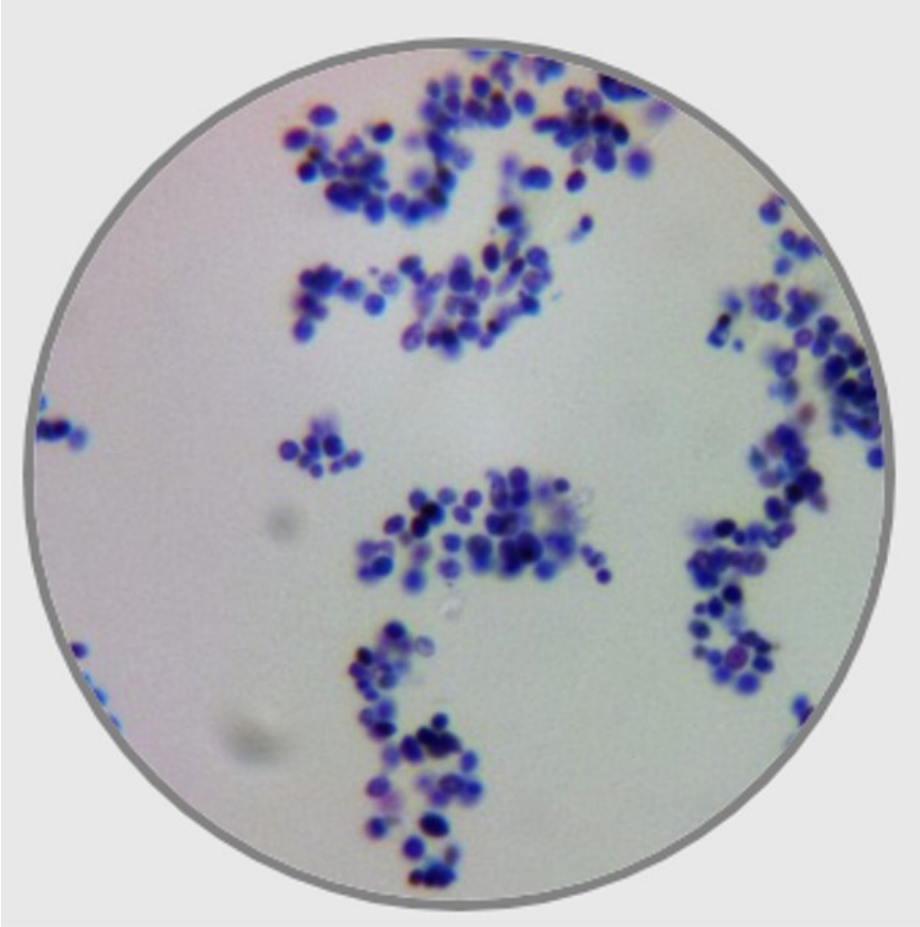
Mushrooms are the fruiting bodies of fungi and composed of hyphal strands from different individuals.

- True ✔
- False

Only multicellular fungi are utilized commercially.

- True
- False ✔

The cells in the micrograph below are examples of ____.



- conidiophores
- hyphae
- mycelium
- yeasts ✔

The brush-like structures circled in the micrograph below are _____.

- conidiophores ✔
- mycelium
- yeast buds
- mushroom spores

The gills are located under the _____ of a dissected mushroom.

- cap ✔
- annulus
- stem
- bud

Extension Questions

Slime molds are a group of eukaryotic organisms that exist as single amoeboid cells feeding on bacteria and fungi in decaying plant material. When food becomes scarce the cells aggregate together and move as a single, slug-like body to locate new food sources and to produce fruiting bodies that release spores. Slime molds engulf their food and digest it internally, and their cell walls lack chitin. Slime molds were once considered fungi but now are classified as protozoans. **Apply**

your knowledge of Kingdom Fungi to explain why slime molds are not fungi. (SAMPLE ANSWER BELOW)

Kingdom Fungi contains organisms that exist as either unicellular yeasts or multicellular structures formed by hyphae. All fungal cell walls contain chitin. Fungi feed by secreting enzymes that break down nutrients that they then absorb. Slime molds consist of amoeboid cells that lack chitin in their cell walls and feed by engulfing bacteria and fungi. Furthermore, slime molds do not exist as hyphae. For these reasons they are not members of the Kingdom Fungi.