



Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Key words

1. mycelium
2. hyphae
3. fruiting body
4. basidiospores
5. paraphyses
6. meiosis
7. secondary
8. sukuti

K • 4

Each carries 0.5 mark.

2 Label the diagram

1. volva (cup)
2. stipe (stalk)
3. pileus (cap)
4. gills: spores are made here

5. annulus (ring)
6. mycelium: a network of hyphae (threads)

K • 3

Each carries 0.5 mark.

3 Multiple choice

- i. c. paraphysis

K • 1

Paraphyses stand between the basidia and make no spores. The basidium makes spores, and the trama is the core of the gill, not a cell of the hymenium.

- ii. a. in the hymenium

K • 1

Basidiospores form on the basidia, which are in the hymenium, the outer layer of the gills.

- iii. b. it takes its food from dead and decaying matter

U • 1

“Saprophytic” means feeding on **dead and decaying** matter. Not making its own food, or depending on others, is true of every heterotroph, including animals and parasites; absorbing food from living organisms is what a **parasite** does.

- iv. b. two, one of each strain

U • 1

The secondary mycelium is made when a plus and a minus primary mycelium fuse, so each cell carries two nuclei, one from each. That is why it is called **dikaryotic**. The primary mycelium has one nucleus per cell; four nuclei appear only in a basidium, after meiosis.

- v. d. none of these: only an expert or a laboratory can tell, so don't eat it

A • 1

Every one of the other “tests” is a myth that has killed people. Some deadly mushrooms smell and taste good and don't blacken silver, and insects eat mushrooms that would kill a person. The only safe rule is to eat farmed or expertly identified mushrooms.

4 Very short answers

- a. MARKING SCHEME

K • 1

✓ Four.

- b. MARKING SCHEME

K • 1

✓ A red mushroom (e.g. Ganoderma).

- c. MARKING SCHEME

U • 1

✓ To kill the germs and molds in the straw.



5 Short answers

a. MARKING SCHEME

U • 2

- ✓ A mushroom has no chlorophyll, so it can't make its own food.
- ✓ Its mycelium absorbs food from dead and decaying matter (rotting wood, dung, straw); an organism that feeds this way is saprophytic.

b. MARKING SCHEME

U • 2

- ✓ Some wild mushrooms are poisonous and can kill, and some look very like edible ones.
- ✓ No simple test (color, smell, silver, cooking) can tell them apart, so only farmed or expertly identified mushrooms should be eaten.

c. MARKING SCHEME

U • 2

- ✓ Any one difference, e.g. a paraphysis is sterile and makes no spores; a basidium is fertile and makes basidiospores.
- ✓ Any second difference, e.g. a paraphysis has no sterigmata, a basidium has four; or a paraphysis supports and spaces the basidia, while in a basidium the nuclei fuse and divide by meiosis.

d. MARKING SCHEME

K • 2

- ✓ The mushrooms are washed, cut into small pieces and dipped briefly in boiling water.
- ✓ They are dried completely (in the sun, over a fire or in an oven) and packed airtight.

6 Long answers

a. ANSWER

U • 4

1. The mature mushroom's gills have a hymenium with basidia. In each basidium, a plus and a minus nucleus fuse into a diploid nucleus.
2. It divides by meiosis into four haploid nuclei (two +, two -). Four sterigmata grow on the basidium, one nucleus goes into each, and four basidiospores form.
3. The ripe basidiospores are released and spread by air.
4. In a suitable place, each spore germinates into a primary mycelium with one nucleus per cell.
5. A plus and a minus primary mycelium fuse to form the secondary (dikaryotic) mycelium, with two nuclei per cell.
6. In the right temperature and moisture, the secondary mycelium forms buttons that grow into mature mushrooms, and the cycle repeats.

Draw the cycle as a ring of these stages: mature mushroom → basidiospores → primary mycelium → secondary mycelium → button → mature mushroom.

MARKING SCHEME

- ✓ In each basidium on the gills, a plus and a minus nucleus fuse into a diploid nucleus, which divides by meiosis into four haploid nuclei.
- ✓ Four basidiospores form on four sterigmata, are released and carried by the air.
- ✓ A spore germinates into a primary mycelium with one nucleus per cell; a plus and a minus primary mycelium fuse into the secondary (dikaryotic) mycelium, with two nuclei per cell.
- ✓ The secondary mycelium forms buttons that grow into mature mushrooms, which make basidiospores again.



b. ANSWER

K · 4

Oyster mushrooms (kanye chyau) are grown on straw: cut clean paddy straw into 1–3 inch pieces, boil it for 15–20 minutes to kill germs, and let it cool and dry until just damp. Fill a plastic bag with 5–6 layers of straw, sprinkling spawn on each layer, press it down, and make 10–12 holes. Keep it in a dark room for about seven days, until white mycelium spreads through it. Then make a few more holes and sprinkle water as needed. Around day 10, cut the plastic so the mushrooms can come out; around day 17, small mushrooms appear; around day 25, pick the grown mushrooms.

MARKING SCHEME

- ✓ Clean paddy straw is cut into 1–3 inch pieces, boiled for 15–20 minutes and cooled until just damp.
- ✓ A plastic bag is filled with 5–6 layers of straw, with spawn sprinkled on each layer, pressed down, tied, and 10–12 holes made.
- ✓ The bag is kept in a dark room for about seven days until white mycelium spreads; more holes are made and water sprinkled as needed.
- ✓ Around day 10 the plastic is cut; small mushrooms appear around day 17 and are picked around day 25.

7 Think**ANSWER**

HA · 2

Mushrooms rot because bacteria and molds feed on them, and these microbes need **water** to grow. Drying removes almost all the water, so they can't grow. Keeping the dry mushrooms airtight stops them from soaking up moisture from the air again. Salt, sugar and acid in the chemical method help too: microbes can't grow well in them. Our ancestors used the same idea for gundruk, sinki and dried meat (sukuti).

MARKING SCHEME

- ✓ Mushrooms rot because bacteria and molds feed on them, and these microbes need water to grow.
- ✓ Drying removes almost all the water, so they can't grow; packing airtight stops the dry mushrooms soaking up moisture again.

8 Activity: A spore print

(not marked)

WHAT STUDENTS SHOULD FIND

A pattern of fine lines, like the spokes of a wheel, under where the gills were. It is made of millions of basidiospores that fell from the gills. Its color is the color of the spores (dark brown for the button mushroom, so it shows best on the white paper; white or pale lilac for the oyster mushroom, which shows best on the dark paper). Experts use the color of the spore print to help identify a mushroom.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	17	13	1	2	33

