

Plant defence responses

4.3.3.2 · Infection and response · revision notes

The physical, chemical and mechanical ways in which plants defend themselves against pathogens and against animals that eat them. This subtopic is GCSE Biology only (not Combined Science). Questions ask you to name defences or to explain how an unfamiliar adaptation helps a plant survive.

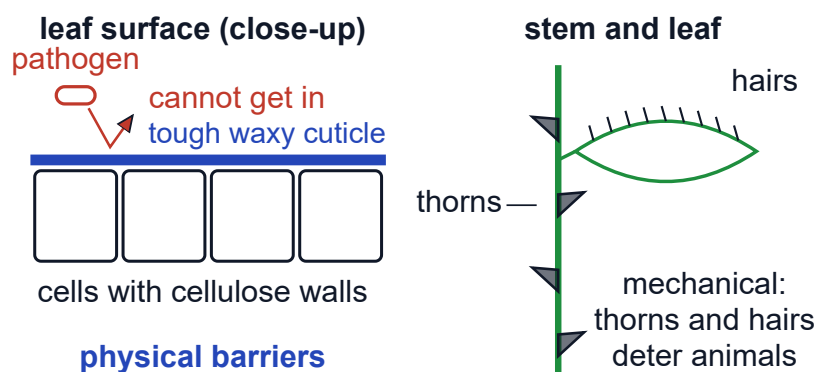
Key facts

- Physical: cellulose cell walls, tough waxy cuticle, layers of dead cells (e.g. bark) that fall off
- Chemical: antibacterial chemicals, poisons to deter herbivores
- Mechanical: thorns and hairs, leaves that droop or curl when touched, mimicry
- Herbivore = animal that eats plants
- Mimicry = looking like something else to trick animals

Notes

Physical defences against microorganisms

- Cellulose cell walls:** a strong layer around each cell that pathogens find difficult to get through.
- A **tough waxy cuticle** on the leaves: a barrier over the leaf surface.
- Layers of dead cells** on the surface of stems, e.g. **bark** on trees. They form a barrier, and they fall off, taking any pathogens on them with them.



Physical barriers keep microorganisms out; thorns and hairs deter animals.

Chemical defences

- Antibacterial chemicals** kill bacteria. Some plants, such as mint, produce them.
- Poisons** deter **herbivores** (animals that eat plants), e.g. foxgloves are poisonous.

Mechanical adaptations against animals

- **Thorns and hairs** deter animals from touching or eating the plant, e.g. the thorns on a rose stem.
- **Leaves that droop or curl when touched**, e.g. in the sensitive plant. This can knock insects off and makes the plant look less appealing to eat.
- **Mimicry** tricks animals. Some plants have spots that look like insect eggs, so the insects do not lay their eggs there. Some plants look like a stinging plant, so animals avoid them.

Why defences matter

- Fewer pathogens infect the plant and fewer animals eat it.
- So it keeps more leaves for photosynthesis and is more likely to survive and reproduce.

How to answer each type of question

Name and classify defences

1 to 3 marks

Grade 3

1. Learn which defences are physical, chemical and mechanical.
2. Give one clear example for each type asked for.

Example. Give **one** physical defence, **one** chemical defence and **one** mechanical adaptation that plants use.

Model answer. Physical: any one from cellulose cell walls, a tough waxy cuticle, layers of dead cells or bark (1). Chemical: antibacterial chemicals or poisons (1). Mechanical: any one from thorns, hairs, leaves that droop or curl when touched, mimicry (1).

Explain how a physical defence protects a plant

2 marks

Grade 5

1. Say that it forms a barrier to pathogens.
2. Add any extra feature, e.g. dead cells fall off, taking pathogens with them.

Example. Explain how bark helps to protect a tree from pathogens.

Model answer. The layers of dead cells form a barrier, so pathogens cannot reach the living cells (1). The dead cells fall off, taking pathogens on their surface with them (1).

Don't lose marks

- ✗ Saying the cuticle or cell wall kills pathogens. Physical defences are barriers; antibacterial chemicals kill bacteria.
- ✗ Calling thorns a defence against microorganisms. Thorns are mechanical adaptations that deter animals.
- ✗ Stopping at 'animals don't eat it' in a 2-mark 'suggest' question, without linking it to the plant's survival.
- ✗ Saying plants make antibodies or have white blood cells. Plants defend themselves with barriers, chemicals and mechanical adaptations.

More tips

Memory tricks

- Two targets: physical barriers and antibacterial chemicals stop microorganisms; poisons and mechanical adaptations stop animals.
- Physical = 'wall, wax, bark': cellulose cell walls, waxy cuticle, dead cells that fall off.
- Always end with the pay-off: fewer pathogens get in or fewer animals eat it → more photosynthesis → the plant survives.

Exam technique

- Decide the type of defence first (physical, chemical or mechanical), then say what it stops (pathogens or animals).
- Unfamiliar examples are common: use the information given and link it to survival.
- Use 'barrier' for defences against microorganisms and 'deter' for defences against animals.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3

Name physical defences of plants

Cellulose cell walls, a tough waxy cuticle on leaves, and layers of dead cells on stems (e.g. bark) that fall off.

Grade 4

Name chemical defences of plants

Antibacterial chemicals, and poisons that deter herbivores.

Grade 4

Name mechanical adaptations of plants

Thorns and hairs, leaves that droop or curl when touched, and mimicry.

Grade 5

Explain how physical barriers stop pathogens

They are barriers that pathogens cannot easily get through, and dead cells take pathogens with them when they fall off.

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