Investigating seed germination

Student activity • practical and reasoning

YEAR 11 / LESSON 84 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How do water availability and temperature affect germination in a defined seed batch?

Set up replicated dishes and return to them over several days; results cannot be completed in one lesson.

Equipment

- Thirty seeds from one known batch per pair; three labelled dishes and paper layers
- Measured water, pipette and access to recorded room/cool temperatures
- Daily count sheet

Do not eat seeds or seedlings. Check seed and plant allergies; avoid treated seed coatings. Wash hands after handling. Keep dishes closed during inspection if mould appears, and have staff remove them without opening or sniffing. Use a science refrigerator, not food-storage space.

Course coverage: Shared Biology / Double Award: 3.5–3.6. Germination and stored reserves.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Label three dishes for the same seed batch: moist at room temperature, dry at room temperature, and moist in a cool location. Use ten seeds per dish on equal paper layers.

2. Add the pilot-selected equal water volume to moist dishes so paper is damp but seeds are not submerged. Keep the dry dish dry; record actual temperatures.

3. Keep light conditions comparable and lids loosely fitted for gas exchange. Record the start date, seed species and batch.

4. Inspect daily for five days, counting a seed as germinated when its root emerges. Record cumulative counts without double-counting; maintain moisture consistently.

5. Compare class replicate dishes and calculate germination percentages. Return a cool dish to room temperature afterwards to distinguish delayed germination from loss of viability.

6. Explain the roles of water, suitable temperature and oxygen, and why stored reserves fuel early growth. State explicitly that this design does not experimentally isolate oxygen availability.

Cleanup

- Staff dispose of seeds and paper after the investigation; keep mouldy dishes closed.
- Clean reusable dishes and wash hands.

Record your evidence

Blank spaces are for your own work

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Reference and task data

This investigation tests water and temperature. Oxygen is required for aerobic respiration during germination, but oxygen availability is not independently varied here. Seed species differ in temperature/light needs and dormancy. Use actual counts; failure to germinate within five days is not proof a seed is dead.

Day	Moist room /10	Dry room /10	Moist cool /10
0			
1			
2			
3			
4			
5			

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 11 / LESSON 84 / BIOLOGY + SCIENCE (DOUBLE AWARD)

1. What is the germination criterion?

2. Why keep seed batch constant?

3. Calculate 8 germinated out of 10 as a percentage.

4. Why might cold delay germination?

5. Where does early respiratory substrate come from?

6. Does this design prove oxygen is required?