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# Common misconceptions in Biology GCSE



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Examiners (and teachers!) are banging their heads against a wall because of “misconceptions” in Biology GCSE. These are common errors that lots of students make. In this blog we highlight some misconceptions that examiners really do not want to see in your answers! Read our advice, revise the topics if necessary and make sure to avoid the pitfalls. It will really help you get higher marks in the exams.

## Cells

**Cell membrane vs cell wall.** First off, you must be able to distinguish between a *cell membrane* and a *cell wall*. All cells have a cell membrane. This membrane separates the contents inside the cell from anything outside the cell. On any cell diagram, cell membrane will be the inner line. If the cell diagram has an outer line, this is the cell wall, and it must be a plant, bacterial or fungal cell.

**The nucleus.** Another pitfall is to call the nucleus the ‘brain of the cell’. Don’t write that in the exam! The nucleus is not a squidgy pink folded organ and examiners just will not accept that response! The nucleus *controls* the cell because it contains the *genetic code to make the cell’s proteins*.



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**Mitochondria.** Mitochondria *release* or *transfer energy* in the cell. Remember that energy cannot be created (or destroyed) so mitochondria do **not** “create” energy.

**Enzymes.** Enzymes are large molecules that are found inside cells. But enzymes themselves are not alive! So they can't die, they can only be *denatured* when the shape of the enzyme molecule changes and this distorts their active site.

**Division vs differentiation.** Finally remember that cell *division* means cells splitting in half, while *differentiation* is when different genes get expressed to specialise the cell for a certain job.



## Respiration and photosynthesis

Plants are *living*. This is a fact! Do not forget it! Unlike animals, plants do not eat. Carbon dioxide, minerals and water are **not** the plant's food. Plants *produce* food and that's why they're called *producers* in food chains.

Plants obtain water from the soil via their *roots*, **not** through their leaves when rain falls on them. In fact, most plant leaves are adapted to allow rain water to fall to the ground.

*Breathing* is **not** the same as *respiration*.

Breathing is a process of drawing air into and out of the lungs and involves your diaphragm, ribs and intercostal muscles. Respiration is an exothermic chemical reaction. It occurs in *all* cells and transfers energy from a glucose chemical energy store to an 'energy currency' molecule called ATP. The ATP can be used for all other processes.

Plants do not have lungs, so they cannot “breathe”. Instead they obtain oxygen from their stomata or from photosynthesis. But plants **do** respire (as all living organisms do). Plants respire *all the time*, not just at night when they have finished photosynthesising.

Think about it: not all living organisms have lungs, but they all respire. So make sure you don't get breathing confused with respiration!

## Bacteria

Bacteria are the only pathogens that antibiotics can be used to treat. When an antibiotic no longer works, the bacteria has not developed antibodies to it so it is **not** “immune”. Instead, it has developed *resistance* to that antibiotic.

Most antibiotics are made by *fungi* (not bacteria – why would bacteria kill themselves?!) Viruses spend most of their time hiding, out of reach, inside cells.

## Energy transfers in ecosystems



In a food chain the *arrows indicate the direction of energy transfer*. The arrows do **not** show what has been eaten, which would make them go in the opposite (wrong) direction.

Does biomass accumulate along the food chain, with a human who has just eaten a cheeseburger gaining the biomass of a cow and the grass that fed it? No! In fact, there's minimal biomass left over after all the energy transfers in that food chain have occurred.



## Evolution and natural selection

Evolution and natural selection are not the same thing. Evolution is a change in a species over time. Natural selection is the process that drives evolution.

For example, if modern humans suddenly went back to ice age, we would **not** suddenly ‘mutate’ and start sprouting a thick coat of fur! Instead, those individuals who happened to be hairier than others (due to inherited genes) would have more insulation and be more likely to survive the cold, reproduce and pass on their ‘hairy’ genes to their offspring. That’s the process of natural selection, gradually driving evolution over time.

