

List of questions to elicit student alternate conceptions

BLC 2024

Pg. 1

Cell and molecular biology	Are we made of cells?
	What do cells DO for us (“units of life”)?
	How long do cells stay alive?
	How is net directional movement of solutes across a membrane different between active and passive transport?
	If you eat a piece of kale, do you become part kale? Do you have kale DNA, kale proteins, kale lipids?
	What types of organisms do photosynthesis?
	What would happen to a cell if DNA couldn’t replicate?
	Why is DNA a superior storage molecule for information?
Cell energetics and cell respiration	Describe how energy (ATP) is derived from fats.
	How do cells create ATP?
	How do plants make ATP?
	How is the oxygen we breathe used by the cell?
	Why do cells need oxygen?
	In mitochondria, what does the electron transport chain produce?
	What macromolecule has the most calories per gram?
Ecology	Are mosquitoes important? Why are why not?
	Does increasing the biodiversity is always benefit the environment?
	Is biodiversity important? Why or why not?
	Why is biodiversity important?
	What is the value of biodiversity?
	What examples can you think of that demonstrate that reductions in species diversity "aren't" or "are" harmful to an ecosystem?
	What causes global warming?
	What is causing global climate change?
	What is a keystone species?
Evolution	How do we define evolution?
	What is evolution?
	How does evolution work?
	What is necessary for evolution to occur?
	Explain how traits evolve through natural selection.
	How does natural selection work?
	What factors drive natural selection?
	What are difference and similarities between natural selection and evolution?
	How do you get an adaptation?
	How does adaptation occur?
	Is evolution happening now?
	How are humans related to chimpazees?
	Does natural selection act on individuals or populations?
Why do many organisms produce more babies than will eventually survive?	

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Gene expression	How do cells make proteins?
	How is DNA transcribed?
	What is the purpose of transcription and translation? When do they occur?
	What is the molecular basis for differential gene expression?
	What leads to different cell types in the body?
	What makes different types of cells different?
	Why do cells need to use different genes under different circumstances?
General	How do you define life?
	How did life on the planet likely start?
	Why is chemistry important to biology?
Genetics	How can someone end up with an extra chromosome in every cell in their body?
	Do dominant and recessive alleles interact with each other to affect the phenotype?
	What is the relationship between the terms gene and chromosome?
	How does one's genetics impact one's bodies and behaviors?
	Do all cells of an organism have the same genome?
Homeostasis and feedback loops	What is homeostasis?
	How do organisms maintain a relatively stable internal environment?
	What is negative feedback?
Learning	Why are my professors biased?
	Is learning a type of negative or positive feedback?
Microbiology	What are bacteria and archaea?
	Are viruses living?
	Are prokaryotes real?
Physiology	What constrains movement of nutrients, gases, and waste in multicellular organisms?
	How is bone density related to calcium concentration?
	What things contribute to the resting membrane potential?
	What is involved in cell depolarization?
	Why would a cell need to hyperpolarize?
	What happens to oxygen when it enters our body?
	What happens to the oxygen we breathe in?
	What is oxygen used for?
	Why do you have to breathe in oxygen?
	Where does the oxygen we breathe go?
	When you are exercising vigorously how much oxygen will be in the blood arriving at the lungs?
	Why does blood flow through the pulmonary circuit need to match blood flow through the systemic circuit?
	What is the adaptive significance of melanin production?
	What things cause or contribute to an ulcer?
How are identical twins formed?	

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Pg. 3

Plants	Do plant cells have mitochondria?
	Which plant cells have mitochondria? chloroplasts? Why?
	Do plants produce carbon dioxide?
	From where does a plant gain its mass?
	Where do plants acquire the carbon they need to build their bodies?
	Where does the mass of a tree come from?
	Draw the two ways that plants contribute to the carbon cycle.
	What metabolic processes do plant cells perform?
	Why is the style so long?
Scientific method	How does the scientific method work?
	What is the difference between hypothesis and theory?
Surface area to volume ratio	Say you shrink an elephant to the size of a mouse. Would the elephant need to grow fur?
	You double the length of the side of a cube. Which increases faster - surface area or volume - and why?