

1. Answers will vary. A sunflower responds to the location of the sun in the sky (external stimulus) by turning to face it as the sun moves across the sky. A sunflower responds to a lack of water (internal stimulus) by shriveling up and conserving water.
2.
 - a. A campfire exhibits many of the characteristics of living things. It uses nutrients in the form of wood (which it uses as a fuel) and oxygen. It produces ashes, coal, and other burnt material as waste. It uses heat energy to keep going; in fact, in the absence of heat, a fire will cease to exist. A fire can grow larger if provided sufficient fuel. A fire can 'reproduce', that is, make more copies of itself, as sparks and other things produced by the fire can spark secondary fires. Fires can also respond to stimuli, e.g. they will sizzle when water is thrown on them, and will appear to move when air is blown at them. However, because fires are not made of cells (if we looked at one up close under a microscope, we would not see the little compartments indicative of cells), a fire does not have all the characteristics of living things and is therefore not a living thing.
 - b. An icicle is not made of cells; instead, it is made of frozen water molecules. An icicle does not use nutrients (there is nothing that an icicle 'needs' to get from elsewhere in order to function as an icicle) and does not produce waste (unless you count the water that drips from it as it melts at the end of its 'lifespan'). An icicle does not use energy to perform any functions. An icicle can grow in size if water is added to it under freezing conditions. An icicle cannot reproduce unless, say, it is split into two. An icicle can respond to stimuli; for example, if the outside temperature is too warm, then the icicle could melt. However, overall, because the icicle lacks more than one of the characteristics of living things, we cannot classify the icicle as being alive.
 - c. It does use nutrients (e.g. paper and ink and electricity) and utilizes electrical energy to function. It can produce waste periodically (e.g. empty ink cartridges; paper waste if a paper jam occurs). A printer can also respond to stimuli; printers are equipped with various buttons and are trained to respond to various commands given by computers such that the printer can perform various functions such as printing, scanning, faxing, etc. (It is these functions that end up using energy to perform). However, a printer lacks several key characteristics of living things. A printer is not made of cells; it is made of wires and other metals and plastic materials. It cannot grow larger or develop in any way (though sometimes manufacturers will come up with updates that can be installed on printers). Printers cannot reproduce and create more 'baby printers' on their own. Thus, printers are not classified as living things.
 - d. A fossil is not alive, though it may once have been part of a living thing. Under a microscope, traces of cells could be visible as little compartments where the cells used to be, much like in Robert Hooke's images of tree bark. But fossils lack all the other characteristics of living things. They do not use nutrients nor produce wastes; there is nothing that a fossil needs, nor nothing that a fossil needs to get rid of, in order to function correctly. Indeed, a fossil does not have any function at all, and thus does not

use energy. Fossils cannot grow nor make copies of themselves by reproducing. Thus, overall, a fossil is not a living thing.

3. Any 5 of the 7 characteristics of living things would be acceptable here. (Made of cells; uses energy; uses nutrients; produces waste; responds to stimuli; grows; reproduces)
4. The squirrel is a consumer. In order to obtain nutrients and energy, it must consume or eat them, as it is doing to the flower in the image. Most plants such as the grasses and other low-lying flowering plants shown in this image are producers. They are green because of the chloroplasts in their cells which conduct photosynthesis. Producers are self sufficient and are able to produce useable energy on their own by converting it from other forms of energy (sunlight).
5. A sundew is some combination of producer and consumer. It is a producer because it can make its own food. However, it benefits from additional nutrients from the insects it captures and consumes.
6.
 - a. As a human grows from a baby to an adult, its number of cells increases dramatically. When a human is injured (e.g. a cut in the skin), some cells die and existing cells must divide in order to repair what has been lost.
 - b. When a human feels hungry (internal stimulus), they eat food. When a human hears a loud noise behind them (external stimulus), they may jump in surprise and turn around quickly.
 - c. Expenditure of energy causes humans to tire out. E.g. after a basketball game, players will feel tired and seek out a source of energy to replenish what has been lost, by eating food.
7. Answers may vary. One reason is because of ethics. Living things should be afforded greater protections than non-living ones. If something is classified as a living thing, then its life should be worth something, and its species' existence should have some weight in terms of environmental and other policies.
8. Answers will vary.