

Read each question carefully and ask if a question seems unclear. For full credit you must clearly and fully answer the question being asked. Points will be deducted for adding extraneous, incorrect information. If you use a drawing as part of your answer, also include a written explanation. Try to answer each question in the space provided, but you may ask for more paper if you need more space. The questions have specific answers, although for some, more than one answer is possible. Each question is worth 10 points for a total of 60 points. Exams in non-permanent ink will **not** be eligible for a regrade.

1. Plants bend toward light. One hormone involved in this response is auxin, and auxin can be found both at the tip of the plant shoot as well as further below the tip. Why is auxin in both places? What is it doing at the tip, and what is it doing below the tip?

Auxin sends a signal from where the direction of light is perceived, the tip, to where the response occurs, below the tip (the elongation zone).

2. With a single neuron which parts of nerve signaling can be done: perception, integration, and/or response? Explain what can be done, and what cannot be done with a single neuron.

Perception and a response could occur; a neuron activated by a stimulus could release neurotransmitters to induce a response. No integration could occur. With a single, once the signal begins, there is not where to intervene and change the response.

3. Would grizzly bears get more nutrients from the food that they eat by lengthening or shortening their digestive system? Why?

Since grizzly bears eat primarily plants, and they have a short carnivore-like digestive system, lengthening their digestive system to more herbivore-like digestive system would allow them to extract more nutrients from their plant-based diet.

4. Is it more important for a female prairie vole or a female montane vole to find a compatible mate? Why?

Prairie voles are monogamous, so since they will only have one mate they must try to ensure that he is compatible. The non-monogamous montane voles will mate with several males, and so if one is not compatible, she can still reproduce with another more compatible male.

5. Depending on the type of genetic modification, the use of genetically modified crops can lead to both increased or decreased contamination of waterways. Give **one** example of how genetically modified crops can lead to increased contamination of waterways, and give **one** example of how genetically modified crops can lead to decreased contamination of waterways.

Several answers are possible: Increased contamination from the use of herbicide (Round-up) resistant crops because the herbicides can be sprayed during the growing season OR from the BT modified crops falling into waterways. Decreased contamination from BT modified crops that make plants toxic to some insects so less pesticides need to be sprayed.

6. A fight occurred and Mike was seriously injured. Either Bill or Frank is suspected of being involved in the fight. DNA from Bill, Frank, and from blood left at the scene of the fight is cut by one restriction enzyme. The pattern of bands from the blood left at the crime scene matches Bill and is different from the pattern in Frank's DNA. Why has Frank been eliminated as a suspect? Why is the current evidence insufficient to convict Bill?

Since the pattern is different between Frank and the sample, the DNA cannot be from Frank. Even though the pattern matches between Bill and the sample, a match with one restriction enzyme is not sufficient to prove it is the same person. There could be other changes in the DNA that are not recognized by the single restriction enzyme.