

Read each question carefully and don't hesitate to ask if a question seems unclear. If possible, answer each question in the space provided, but if needed, continue on the back. If you use a drawing as part of your answer, be sure to also include a written explanation. These questions have specific answers, although for some, more than one answer is possible. To receive full credit you must clearly and fully answer the question being asked. If you add incorrect extraneous information, points will be deducted. The points for each question are noted in parentheses totaling 60 points.

1. Can Strong Inference be used to answer the question, "Should organisms be patented?" Why or why not? (10 pts)

No. This is not a disprovable proposition. While it is possible to have multiple hypotheses, basically yes or no, no experiment can disprove either hypothesis.

2. If the coding region of a gene is 300 nucleotides long, and 1 nucleotide is added to the end of the coding region, so now the coding region is 301 nucleotides long. In the protein produced from this gene, how many amino acids were changed? Why? (8 pts)

Zero. The 300 nucleotides that code for the 100 amino acids are still intact, so nothing would change. OR If that 1 nucleotide changes the terminator, making the coding region longer, the protein will have more amino acids.

3. a) Where in a cell would you find nucleotides and amino acids interacting? Why are they interacting in this location?

b) Describe a second part of a cell where amino acids and nucleotides would interact, and why they are interacting at this location. (8 pts)

Any two of: In the nucleus where proteins package DNA, or where proteins transcribe DNA, or where proteins transport RNA from the nucleus to the cytoplasm. In the cytoplasm where RNA is being used to make proteins.

4. When you eat food containing sugar, some cells in your body break down the sugars while other cells store the sugars. Other than their different function, what is different about these cells? (8 pts)

Any of: They express different genes. They have packaged different genes. They contain different proteins. One has simple sugars while the other has complex sugars.

5. If fraternal twins that grow up together have a higher probability of liking the same TV shows compared to fraternal twins that grow up apart. Does this show a genetic or environmental influence on this trait? Why? (8 pts)

Environmental. The genetic relationship between the different sets of fraternal twins does not change depending on where they grew up. The change in households is also a change in their environment, which indicates an environmental influence on this trait.

6. Researchers are studying some cells that are extremely sensitive to both cold and hot temperatures. In other words, these cells can only survive at moderate temperatures. What problem do these cells have that would explain their sensitivity to both cold and hot temperatures? (8 pts)

They lack cholesterol, or lack sufficient cholesterol. Cholesterol helps inhibit both membrane solidification from cold as well as gaps caused by too much phospholipid movement from hot temperatures.

7. Using the data in this figure, give **two** reasons that you cannot determine someone's sexuality by looking at their birth weight. (10 pts)

Any two of: There is no relationship between birth weight and sexuality for females. Many homosexual men do not have lower birth weight. There can be many reasons for low birth weight (like premature birth), unrelated to sexuality.

