

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. Molly is studying if squirrels at U.T. will eat snickers® bars. She offers snickers® bars to many squirrels around campus, and they all eat them. So she concludes that squirrels at U.T. will eat snickers® bars. Has she done Strong Inference properly? Why or why not? (10 pts)

Yes. There were 2 hypotheses, yes or no, and with her experiment either one could have been disproved. By disproving 'no', she should accept 'yes' as the correct answer.

2. In the coding region of a gene, there is a substitution (a changed nucleotide). Another gene's coding region has a deletion of one nucleotide. Would the probability of these mutations causing a disease be the same or different? Why? (8 pts)

No. Due to redundancy, substitutions may not change the amino acid sequence of the protein. Because of changes in the reading frame, which 3 nucleotides will be read for each amino acid, a deletion will always cause changes to the protein.

3. Life can be defined as having the following properties: organization, metabolism, responsiveness, and replication. Which biomolecule, by itself, would fit more of these life characteristics? Explain how this biomolecule has, or lacks, these properties of life. (8 pts)

Either:

Proteins- Organized as strings of amino acids with a specific 3-D shape. Act as enzymes carrying out metabolism (chemical reactions). Respond via action as signal molecules. Cannot replicate.

Nucleotides- Organized as strings of nucleotides with a specific 3-D shape. Cannot carry out metabolism (except RNA, this was not discussed in class, but is a correct answer). Respond via changes in gene expression and during development. Replicate as transposons, and carry information as hereditary units.

4. Researchers are studying some cells that die in 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.

5. Transposons are an example of genes acting as replicating units. Connect transposons to **two** other perspectives of genes. (8 pts)

Any two of: Transposons are passed on/inherited. Transposons can cause disease when they insert into a gene. Some transposons produce a protein, called transposase (this was not covered in class, but is correct). Transposons can disrupt coding regions, changing the protein, and genes code for proteins. Transposon translocation can disrupt a promoter, and promoters regulate

6. You have access to data about the the favorite colors of the following groups: fraternal twins raised together, fraternal twins raised apart, biological siblings raised together, and biological siblings raised apart. Using this data, what, if anything, could you determine about the genetic and environmental influences on favorite color? (8 pts)

No conclusions about genetic influences can be reached because a ll of these individuals share similar genetic relationships. The effect of the environment could be measured because the fraternal twins have a more common environment since they share a womb and are the same age, and we have data about people living in similar and separate environments (families).

7. The figure below shows index to ring finger ratios of males. The white bars are men with no older brothers, the diagonally-hashed bars are men with one older brother, and the cross-hatched bars are men with more than one older brother. What does this data say about how older brothers affect the environment in the womb for younger brothers? (10 pts)

Males with 2 or more older brothers have a smaller ratio, indicating increased exposure to androgens (testosterone) in the womb.

