

Biology Unit: Molecular Genetics "I Can..." Statements

1. I can describe the structure of a nucleotide.
2. I can distinguish between a RNA and DNA nucleotide.
3. I can explain why the hydrogen bonds between the base pairs need to be weak.
4. I can explain the general process of DNA replication.
5. I can explain when DNA replication occurs during the Cell Cycle.
6. I can explain why cells must replicate DNA before division.
7. I can explain where in a eukaryotic cell DNA replication occurs.
8. I can explain where in a eukaryotic cell RNA transcription occurs.
9. I can explain where in the cell translation occurs.
10. I can explain the double-stranded structure of DNA.
11. I can explain the importance of complementary base pairing in the processes of DNA replication, RNA transcription, and translation.
12. I can explain how DNA determines our genetic traits. (DNA → mRNA → amino acid sequence → protein shape → protein function → trait → phenotype).
13. I can explain how DNA is transcribed into a molecule of RNA.
14. I can compare and contrast the structure/function of DNA with RNA.
15. I can explain how a molecule of mRNA is translated into a polypeptide.
16. I can explain why cells must transcribe molecules of RNA.
17. I can explain that the amino acid sequence of a polypeptide determines both the protein's shape and function.
18. I can explain the relationship between an mRNA codon and a tRNA anti-codon.
19. I can explain the necessary role of mRNA in translation.
20. I can explain the role of tRNA in translation.
21. I can explain how all cells in a organism have the same DNA.
22. I can explain how cell structure becomes differentiate and specialized through the expression of different genes (turning on/off of genes).

23. I can explain the advantages the expression of proteins at the correct time (development) and in the right amount.
24. I can explain the disadvantages of over production of protein or expression at incorrect times (cancer).
25. I can translate an amino acid sequence using The Genetic Code (codon chart) when given mRNA codons.
26. I can translate an amino sequence using The Genetic Code (codon chart) when given tRNA anti-codons.
27. I can explain how the sequence of amino acids determines how the protein folds, and therefore the protein's shape and function (as with enzymes.).
28. I can explain how changes in the nucleotide sequence effects the translated amino acid sequence, protein function, and phenotype. (substitutions, deletions, and additions).
29. I can explain why only mutations occurring in gametes are passed on to offspring.
30. I can identify which genetic information can be used to compare and identify related organisms. (DNA and RNA base sequences, and amino acids sequences).
31. I can explain the role of restriction enzymes.
32. I can explain how the process of gel electrophoresis separates DNA fragments by size.
33. I can determine relative sizes of different DNA fragments when ordered in a DNA fingerprint. (larger ones stay closer to loading wells)
34. I can explain why two different nucleotide base sequences, when cut with the same restriction enzyme, will yield different DNA fingerprints.
35. I can interpret the results of gel electrophoresis.
36. I can identify the practical uses of DNA fingerprinting.
37. I can define "transgenic organism".
38. I can explain the use of transgenic bacteria in the production of human insulin.
39. I can generalize the applications of transgenic organisms in agriculture.

40. I can summarize the steps in bacterial transformation.
41. I can identify reasons for establishing The Human Genome Project.
42. I can evaluate some of the science of gene therapy in the treatment of different genetic disorders (specifically Severe Combined Immunodeficiency and Cystic Fibrosis).
43. I can evaluate and critique the ethical issues, implications, and responsibilities of genomics and biotechnology (e.g. stem cell research, gene therapy, and genetically modified organisms).