Bio 122 – Exam Review Answers

***Chapters 3 & 4***

1. Base-pairing is a process that allows each nucleotide to bind with only one other specific nucleotide. Adenine will always bind with Thymine (or Uracil in RNA) and Cytosine will always bind with Guanine. A – T (U), C – G.
2. Original Strand: TACCGTAGTCAGTACGATAGCTAGCATAGCTA

Complimentary DNA: ATGGCATCAGTCATGCTATCGATCGTATCGAT

Original Strand: TACCGTAGTCAGTACGATAGCTAGCATAGCTA

Complimentary RNA: AUGGCAUCAGUCAUGCUAUCGAUCGUAUCGAU

1. Creating a protein:
   1. A strand of mRNA is created for a particular gene.
   2. The mRNA strand travels to a free ribosome.
   3. The rRNA “reads” the mRNA three nucleotides (or one codon) at a time.
   4. The codon from the mRNA binds to an anti-codon on a strand of tRNA.
   5. When binding occurs, the tRNA releases its amino acid into a chain (polypeptide)
   6. When the chain is complete, it folds into a protein.
2. Proteins are the cell’s “workers”. They do everything from carry messages, build organelles, allow in materials and excrete wastes from the cell. They are also a key component of the cell membrane.
3. A mutation could result in one of three options:
   1. No effect – the mutation occurs in “junk” DNA and has no effect on the organism.
   2. Beneficial effect – the mutated gene increases the organism’s fitness and increases the chances of its survival.
   3. Negative effect – the mutated gene decreases the organism’s fitness and reduces its overall life-expectancy.
4. Mutations are not all bad. Some have no effect and many are beneficial. See question #5.
5. Point mutations are the result of only one (or a few) nucleotides changing. The can be replaced by another (substitution), deleted or added. Substitution results in only one amino acid being different in the resulting protein, but addition / deletion shifts the entire reading frama and created an entirely different protein.

Chromosomal mutations affect entire genes. The genes can be deleted, switched onto another chromosome, their location can flipped within a chromosome, etc…

1. a. Transformation – a permanent change in an organisms genotype.

b. Complimentary DNA strands – Strands of DNA that can bind to each other because they have “opposite” nucleotides in the correct sequence.

c. Genes – specific sections of DNA located on specific chromosomes that code for particular traits.

d. Proteins – the result of a completed polypeptide, or chain of amino acids.

e. Introns – The sections of mRNA that contain no useful information. It is cut out during the editing process.

Exons - The sections of mRNA that contain useful information. They are “glued” together during the editing process.

f. bacteriophage – a virus that attacks and kills bacteria.

g. enzymes – chemicals found within living organisms that control chemical reactions.

h. amino acids – molecules that attack in a particular order to create a protein. There are 20 known amino acids.

i. Transcription – the process of creating a strand of mRNA from a strand of DNA.

j. codons – a section of three nucleotides that gets “read” by tRNA in the ribosome. There are 64 codons, and they code for the attachment of amino acids to the polypeptide chain.