**IB Biology HL:** Transcription & Translation Review (2.7, & 7.2-7.3) **NAME:**

1. Compare *transcription* with *translation*:

|  |  |  |
| --- | --- | --- |
|  | **Transcription** | **Translation** |
| Begins with… |  | mRNA |
| Ends with… |  |  |
| Location in cell… |  |  |
| Uses… | RNA polymerase, Transcription factors, Ribonucleoside triphosphates |  |

1. Describe what is meant by the genetic code being ***degenerate*** and ***universal***:
2. Outline how E. coli bacteria can be modified to produce Human insulin proteins:
3. Transcribe and translate this DNA sequence:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DNA** | **T** | **A** | **C** | **G** | **G** | **G** | **C** | **C** | **C** | **G** | **T** | **G** | **A** | **C** | **A** | **G** | **C** | **C** | **A** | **C** | **T** |
| **mRNA** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Amino acid** |  |  |  |  |  |  |  |

1. Quick mathematical questions:
2. An mRNA strand has 76 codons. How many amino acids will be in the polypeptide? \_\_\_\_\_\_
3. A polypeptide contains 103 amino acids. What is the length of the gene (unit = base pairs)? \_\_\_\_\_\_
4. What are the roles of Promoter, Silencer, and Enhancer sequences of DNA in Transcription? (HL)
5. What are *sense* and *antisense* strands in DNA? (HL)
6. A single-copy gene (a gene that codes for a polypeptide) contains ***introns*** and ***exons***. What are these? (HL)
7. Outline the three steps involved in processing pre-mRNA in eukaryotes before translation. (HL)
8. Describe how Alternative Splicing allows for the production of thousands of different polypeptides from the same single-copy gene. (HL)
9. Describe how nucleosomes can turn genes on or off in response to environmental factors. (HL)
10. Outline one example of an environmental factor influencing gene expression in an organism. (HL)
11. What are the three stages of translation? Briefly describe what occurs in each stage (HL)

**tRNA**

1. Draw a diagram of a tRNA molecule and explain how specific amino acids are attached to the 3’ end.
2. Draw and label a diagram of a ribosome, showing the large and small subunits, three tRNA binding sites and mRNA binding sites.

**Ribosomes**

1. What is the difference between the fate of polypeptides produced on bound (RER) ribosomes and free ribosomes?
2. Why can transcription and translation occur simultaneously in prokaryotes but not eukaryotes?