Blog resource: <http://tinyurl.com/2vdp3s7> Click4Biology: <http://tinyurl.com/4nxfab9>

Cite all sources using the CSE method (or ISO 690 Numerical in Word. Highlight all objective 1 command terms in yellow and complete these **before class**. Highlight all objective 2 and 3 command terms in green – these will be part of the discussions in class. After class, *go back and review them*.

Complete the **self-assessment rubric** before submitting to Moodle. Avoid printing this if possible.

A great place to start**: What makes a firefly glow?** <http://learn.genetics.utah.edu/content/begin/dna/firefly/>

1. State the *central dogma of genetics*.



1. Transcription and translation is also known as *protein synthesis*, and is **the expression of genes**. The genetic code determines the amino acid sequence of a polypeptide, and the properties of the amino acids give the final structure and function of the protein.

*Other than membrane proteins, state four functions of proteins in the cell.*



1. Protein synthesis relies on RNA as a messenger and translating molecule.

Compare the structures of DNA and RNA.

|  |  |
| --- | --- |
| **DNA** | **RNA** |
| Similarities: | |
| Differences: | |
|  |  |
|  |  |

1. Compare the processes of transcription and translation.

|  |  |  |
| --- | --- | --- |
|  | **Transcription** | **Translation** |
| Begins with… |  | mRNA |
| Ends with… |  |  |
| Location |  |  |
| Uses… | RNA polymerase |  |

1. Outline the process of transcription in the nucleus, including the roles of RNA polymerase and complementary base pairing.



1. Describe the *genetic code*:

|  |  |
| --- | --- |
| Molecule used |  |
| Function |  |
| Codon | A set of three bases, complementary to the DNA triplet |
| Start codon |  |
| Stop codon |  |

1. Distinguish between *triplets* and *codons*.

* Triplets:
* Codons:

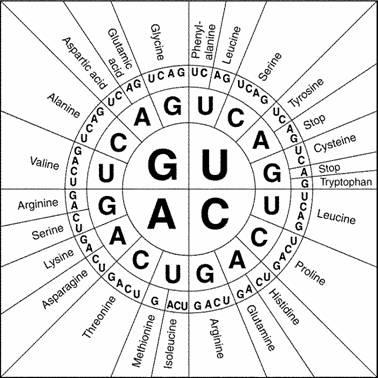
1. Explain the significance of the following:

**The genetic code is universal.**



**The genetic code is degenerate.**



1.  Deduce the amino acids translated from these mRNA codons, using the table. Start in the middle.

AUG =

CAG =

UCA =

GAC =

AAA =

UGA/UAG =

1. Distinguish between *mRNA* and *tRNA*.

* mRNA
* tRNA

1. Explain the process of translation, including mRNA, tRNA, codons, anticodons, ribosomes and amino acids.



1. 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?



1. A polypeptide contains 103 amino acids. What is the length of the gene (unit = base pairs)?



1. A gene is 105kbp (kilobase pairs). How many amino acids are in the polypeptide?



1. Discuss the *one gene, one polypetpide* hypothesism in terms of *paradigm shifts* (how scientific thinking changes as the result of new discoveries – TOK link).

# Works Cited

1. **Allott, Andrew.** *IB Study Guide: Biology for the IB Diploma.* s.l. : Oxford University Press, 2007. 978-0-19-915143-1.

2. **Mindorff, D and Allott, A.** *Biology Course Companion.* Oxford : Oxford University Press, 2007. 978-099151240.

3. **Clegg, CJ.** *Biology for the IB Diploma.* London : Hodder Murray, 2007. 978-0340926529.

4. **Campbell N., Reece J., Taylor M., Simon. E.** *Biology Concepts and Connections.* San Fransisco : Pearson Benjamin Cummings, 2006. 0-8053-7160-5.

5. **Taylor, Stephen.** *Science Video Resources.* [Online] Wordpress, 2010. http://sciencevideos.wordpress.com.

6. **Burrell, John.** *Click4Biology.* [Online] 2010. http://click4biology.info/.

7. **IBO.** *Biology Subject Guide.* [Online] 2007. http://xmltwo.ibo.org/publications/migrated/production-app2.ibo.org/publication/7/part/2/chapter/1.html.

**Self Assessment:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Essential Biology** | | | **Assessment** | |
| **Criterion** | **Complete (2)** | **Partially complete (1)** | | **Self** | **MrT** |
| Presentation & Organisation | NA | Complete and neat. All command terms highlighted, tables and diagrams well presented. | |  |  |
| Academic Honesty | NA | Sources cited using the CSE (ISO 690 numerical) method, with Works Cited section complete and correct. | |  |  |
| **Objective 1** understanding | **All** answers for the following command terms correct: | Most answers for the following command terms correct: | |  |  |
| **Define Draw Label List Measure State** | | |
| **Objective 2** understanding | **All** answers for the following command terms correct: | | Most answers for the following command terms correct: |  |  |
| **Annotate Apply Calculate Describe Distinguish Estimate Identify Outline** | | |
| **Objective3**  understanding | **All** answers for the following command terms correct: | | Most answers for the following command terms correct: |  |  |
| **Analyse Comment Compare Construct Deduce Derive Design Determine Discuss**  **Evaluate Explain Predict Show Solve Sketch Suggest** | | |
| Logic, notation, mathematical working | NA | Answers are presented in a logical and concise manner. SI units used most times, with correct unit symbols and definitions of terms. All mathematical working shown. | |  |  |
| Further research | NA | *Evidence* is apparent of research and reading beyond the textbook and presentations to find correct answers to challenging questions. **If any questions are unanswered, this criterion scores zero.** | |  |  |
|  | **Total (max 10):** | | |  |  |