**Topic 7 Nucleic Acids (AHL) – 7.2 Transcription**

**Understandings, Applications and Skills** (This is what you will be assessed on)

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| --- | --- | --- |
|  | **Statement** | **Guidance** |
| 7.2.U1 | Transcription occurs in a 5’ to 3’ direction. | RNA polymerase adds the 5´ end of the free RNA nucleotide to the 3´ end of the growing mRNA molecule. |
| 7.2.U2 | Nucleosomes help to regulate transcription in eukaryotes. |  |
| 7.2.U3 | Eukaryotic cells modify mRNA after transcription. |  |
| 7.2.U4 | Splicing of mRNA increases the number of different proteins an organism can produce. |  |
| 7.2.U5 | Gene expression is regulated by proteins that bind to specific base sequences in DNA. |  |
| 7.2.U6 | The environment of a cell and of an organism has an impact on gene expression. |  |
| 7.2.A1 | The promoter as an example of non-coding DNA with a function. |  |
| 7.2.S1 | Analysis of changes in the DNA methylation patterns. |  |

**Recommended resources:**

Allott, Andrew. *Biology: Course Companion.* S.l.: Oxford UP, 2014. Print.

Mrs. Tyler’s Flipped Lessons:

**Flip Video: Transcription**

**Background**

1. Define a gene.
2. Outline the two steps needed to make a protein.
3. Compare and contrast DNA and RNA.

7.2.U1 Transcription occurs in a 5’ to 3’ direction.

1. State the direction of transcription and draw a simple diagram to show the addition of an RNA molecule to a growing mRNA strand.
2. State the role of NTPs in mRNA production.
3. Label the sense and antisense strand, then define them.



1. Annotate the diagram to explain the role of each of the three parts of a gene.



1. Outline the three steps of transcription.

9. Define the term operon.

Transcription videos/animations to watch:

* <http://highered.mcgraw-hill.com/sites/0072507470/student_view0/chapter3/animation__mrna_synthesis__transcription___quiz_1_.html>
* <https://www.youtube.com/watch?v=5MfSYnItYvg>
* <http://www.stolaf.edu/people/giannini/flashanimat/molgenetics/transcription.swf> (use internet explorer)

**Flip Video: mRNA Processing**

7.2.U3 Eukaryotic cells modify mRNA after transcription.

1. State the only type of cells that require mRNA processing to form mature mRNA. Why?
2. List the 3 steps involved in mRNA processing.
3. Outline the process of capping and explain why it is important in mRNA processing.
4. Outline the process of polyadenylation and explain why it is important in mRNA processing.
5. Distinguish between introns and exons in eukaryotic DNA.



1. Define splicing.

1. Complete the table to outline the process of splicing in mature mRNA formation.

|  |  |
| --- | --- |
| Spliceosome | * causes the intron to form a loop
*
 |
| Introns | *
*
 |
| Mature mRNA | * contains only exons
*
 |



Mature mRNA

7.2.U4 Splicing of mRNA increases the number of different proteins an organism can produce.

1. The splicing process above can happen in different ways to the same gene, and can involve removal of exons. This is called **alternative splicing.**
	1. Describe how this happens.

* 1. What are the implications for the proteins made by genes that are alternatively spliced?
	2. Name two examples of a protein families that are commonly alternatively spliced.