

**AQA, OCR, Edexcel**

**A Level**

# **A Level Biology**

**Control of Gene Expression  
Answers**

Name:

**M M E**

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**Total Marks: /34**

## Control of Gene Expression

Answer	Marks
<p>1.</p> <p>a)</p> <p>i) DNA is not transcribed and so not translated to form a protein</p> <ul style="list-style-type: none"> <li>- Different proteins means different structure/function.</li> </ul> <p>ii) Transcription factors move from the cytoplasm to the nucleus</p> <ul style="list-style-type: none"> <li>- Bind to specific DNA sites of target genes that they then control/ promoter region</li> <li>- Turn on/off transcription</li> </ul> <p>iii) Can either act as an activator or repressor of transcription depending on the cell/target gene</p> <p>b)</p> <p>i) Unit of DNA containing a number of genes controlled by one promoter</p> <p>ii) Produces enzymes to digest lactose/ accept lactase.</p> <p>iii) - When lactose is available</p> <ul style="list-style-type: none"> <li>- CAP acts as a lactose sensor</li> <li>- CAP is a transcription factor</li> <li>- If it detects lactose it causes the protein to bind to DNA of the lac operon/ promoter.</li> <li>- Causes RNA polymerase to attach to the promoter</li> <li>- Increases the level of transcription</li> </ul>	<p>2 marks</p> <p>3 marks</p> <p>1 mark</p> <p>1 mark</p> <p>4 marks</p>

<p>iv) It activates CAP (when glucosoe levels are low)</p> <p>c) i) - pre-mRNA contains introns and exons -introns are non-coding sections of DNA that need to be removed before translation - this occurs through a process called splicing which removes introns and joins exons together</p>	<p>1 mark</p> <p>3 marks</p>
<p>2. a) i) <u>Any two environmental factors:</u> - Diet/pollution/ lifestyle/smoking/ alcohol/chemical exposure</p> <p>ii) Because the DNA is so long it must be packaged/ organised. - It does this by coiling around protein structures called histones</p> <p>b) i) -Methylation - attachment of a methyl group to the promotor. -inhibits gene expression - Histone modification - chemical groups are added to the histone tail/ acetylation/ addition of an acetyl group. - changes the interaction between histone and DNA -Increases gene expression.</p> <p>ii) It was thought that diseases</p>	<p>2 marks</p> <p>2 marks</p> <p>4 marks</p>

<p>were caused by a change in the DNA sequence (mutation) as a result of genetics or environmental factors</p>	<p>1 mark</p>
<p>3.</p> <p>a)</p> <p>i) – regulatory genes that control how the structure of different areas of the body develop</p> <ul style="list-style-type: none"><li>- Genes code for proteins that function as transcription factors</li><li>- These switch on and off other genes</li></ul> <p>ii) <u>Any two from:</u></p> <ul style="list-style-type: none"><li>-cell adhesion/division/death/movement</li></ul> <p>iii) <u>Any two from:</u></p> <ul style="list-style-type: none"><li>- Gene are known to control body development</li><li>- Hox genes are found across all organisms</li><li>- Simpler organisms have simpler Hox genes</li><li>- The increase in the number of Hox genes correlates with a greater complexity in body structure.</li></ul> <p>iv) – B is a mutant with two sets of wings</p> <ul style="list-style-type: none"><li>- Mutation occurred in Ubx gene</li></ul>	<p>3 marks</p> <p>2 marks</p> <p>2 marks</p> <p>2 marks</p>