**Year 11 Human Biology: Chapter 13 Review**

1. The following diagram represents a short segment of DNA.



Name the substances labelled A, B and C.

A:

B:

C:

2. Nucleic acids are broken down into these smaller units called: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Using the following diagram:



If A is cytosine, then B is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If C is thymine, then D is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. If there are 30 adenine bases in the sequence how many thymine bases would there be? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Briefly explain why the sequence of nitrogenous bases in DNA is important.

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6. Earlier this term you identified that a function of the nucleus is to control the functioning of the cell. Using your knowledge of DNA, explain this more in detail.

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7. Use diagrams in the box below that show clearly the difference between the following terms: *DNA*, *Gene*, *Chromatin*, *Histone*, *Chromosome* and *Centromere.*

8. DNA is also found in the mitochondria. Complete the table below for the two types of DNA.

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|  | **Nuclear DNA** | **Mitochondrial DNA** |
| *Location* |  |  |
| *Structure/Shape* |  |  |
| *Bound by proteins? Yes/no* |  |  |
| *Function/importance* |  |  |
| *Inheritance* |  |  |

9. Why is nuclear DNA bound by histones?

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10. When cells reproduce (mitosis and meisosis) the DNA in the nucleus replicates.

(a) Outline why it replicates.

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(b) describe the process of DNA replication (you may wish to use images to assist)

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11. The other type of rucleic acid is Ribonucleic Acid, use the table below to outline the similarities and difference between DNA and RNA.

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|  | **DNA** | **RNA** |
| *Differences* |  |  |
| *Similarties* |  |

12. RNA is involved in the production of proteins, which play important roles in the body. Give five examples of proteins found in the body.

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13. There are three types of RNA are listed below. Distinguish between them.

Messenger RNA (mRNA)

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Transfer RNA (tRNA)

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Ribosomal RNA (rRNA)

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13. Define the following the terms (you may wish to use images to assist)

(a) Codon

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(b) Anticodon

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(c) Amino acid

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(d) peptide bond:

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(e) Protein:

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14. Protein synthesis is the process that builds proteins from small amino acids and requires energy (ATP).

(a) Outline the site for protein synthesis: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(b) This process occurs two steps. These are Transcription and Translation. Describe in detail what occurs in each of these steps.

Transcription:

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Translation:

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15. If the DNA in the nucleus has the following sequence, outline the mRNA codons that are made and the tRNA anticodons:

DNA sequence: A T T – C G A – T A G – C T C – G G A

mRNA codons:

tRNA anticodons:

16. Although protein synthesis seems complicated it occurs very quickly. How quickly does it take a ribosome to make a protein, consisting of 400 amino acids? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

17. The following table is used to determine the specific amino acids based on the mRNA codon. Determine the amino acid for the following mRNA codons:



(a) A U G: \_\_\_\_\_\_\_\_\_\_\_\_

(b) G G C: \_\_\_\_\_\_\_\_\_\_\_\_

(c) U U A: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

(d) C A G: \_\_\_\_\_\_\_\_\_\_\_\_

18. Identify the structures/processes shown in the diagram below:



19. What determines how long an amino acid chain will be?

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20. Are lipids and carbohydrates made in the same way? Describe why or why not.

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21. Gene expression is the process of copying information from DNA onto mRNA and then translating the message into a series of amino acids to form a protein. Thus the genes contain instructions for making mRNA.

The specific genes that are used to make mRNA are said to be ‘switched on’ and a gene that is not used is said to be ‘switched off’. There are many factors that determine whether a gene is expressed (whether it is on or off).

(a) Outline some examples of factors that can affect gene expression:

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(b) Why is gene regulation/expression usually ‘turned off’ most of the time? What advantage does this have?

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22. Define Epigenetics

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23. What is the difference between a person’s Genome and Epigenome?

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24. Two epigenetic factors that can affect gene expression are Acetylation and Methylation. These factors do not change the DNA, they interfere with transcription and/ or translation, which changes the way proteins are produced by the cell.

Complete the table below for these factors.

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|  | **Histone modification / Acetylation** | **Methylation** |
| *Description of what is happening**(you may wish to use an image to assist)* |  |  |
| *The effect on gene expression* |  |  |

25. A person’s epigenome can be influenced or changed by exposure to certain environmental stimuli. Provide two examples to show how this is so.

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26. Why are identical twins often used to study/explain epigenetic differences?

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