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# BIOLOGY

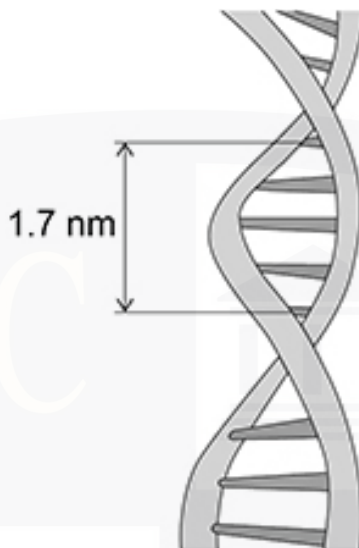
**GENETICS, BIODIVERSITY & CLASSIFICATION**

Level & Board	AQA (A-LEVEL)
TOPIC:	Transcription & Translation
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	6
TOTAL MARKS	39

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## Transcription and Translation - 1

1. A portion of a DNA molecule is shown in the diagram below.



**(a)** Identify the kind of link that exists between **(2)** complimentary base pairs

neighboring DNA strand nucleotides

**(b)** The amount of nucleotide base pairs a gene contains is used to determine its length.

Utilizing the data in the diagram above, determine the length of a gene with  $4.38 \times 10^3$  base pairs. **(2)**

I am Sorry !!!!!

Answer \_\_\_\_\_ nm

**(c)** List two distinctions between the tRNA and mRNA molecules structural compositions. **(2)**

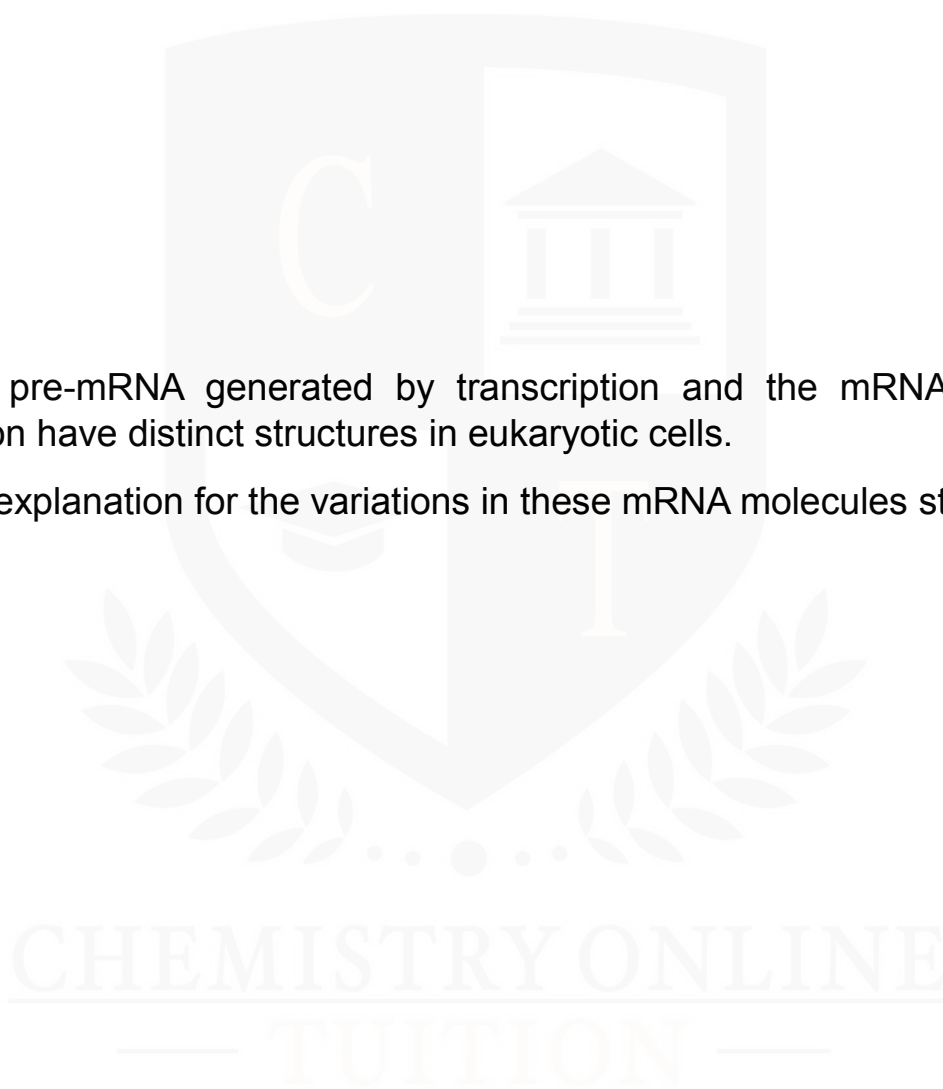
**1.**

**2.**

**(d)** The pre-mRNA generated by transcription and the mRNA used in translation have distinct structures in eukaryotic cells.

Give an explanation for the variations in these mRNA molecules structures.

**(2)**



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**2.**

**(a)** Explain the process by which a polypeptide is generated at a ribosome during translation when one amino acid is added. **(3)**



**3.**

**(a)** Explain the process by which exposed template DNA strands are converted into mRNA.

In your response, do not mention splicing or DNA helicase. **(3)**

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Some amino acid mRNA codons are displayed in the table below.

<b>Serine</b>	<b>Proline</b>	<b>Glycine</b>	<b>Threonine</b>	<b>Alanine</b>
UCU	CCU	GGA	ACU	GCA
UCC	CCA	GGG	ACC	GCG

**(b)** The nucleotide base sequence of the DNA template, which establishes the order of four amino acids, is displayed in **Figure 1**.

**Figure 1**

**AGG CGT CCT GGA**

Provide the amino acid sequence determined by this nucleotide sequence using the data in the table and **Figure 1**. **(1)**

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**4.**

**(a)** Explain how transcription produces mRNA in eukaryotes. **(5)**



**(b)** Explain how mRNA translation results in the formation of a polypeptide.

**(6)**

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**5.**

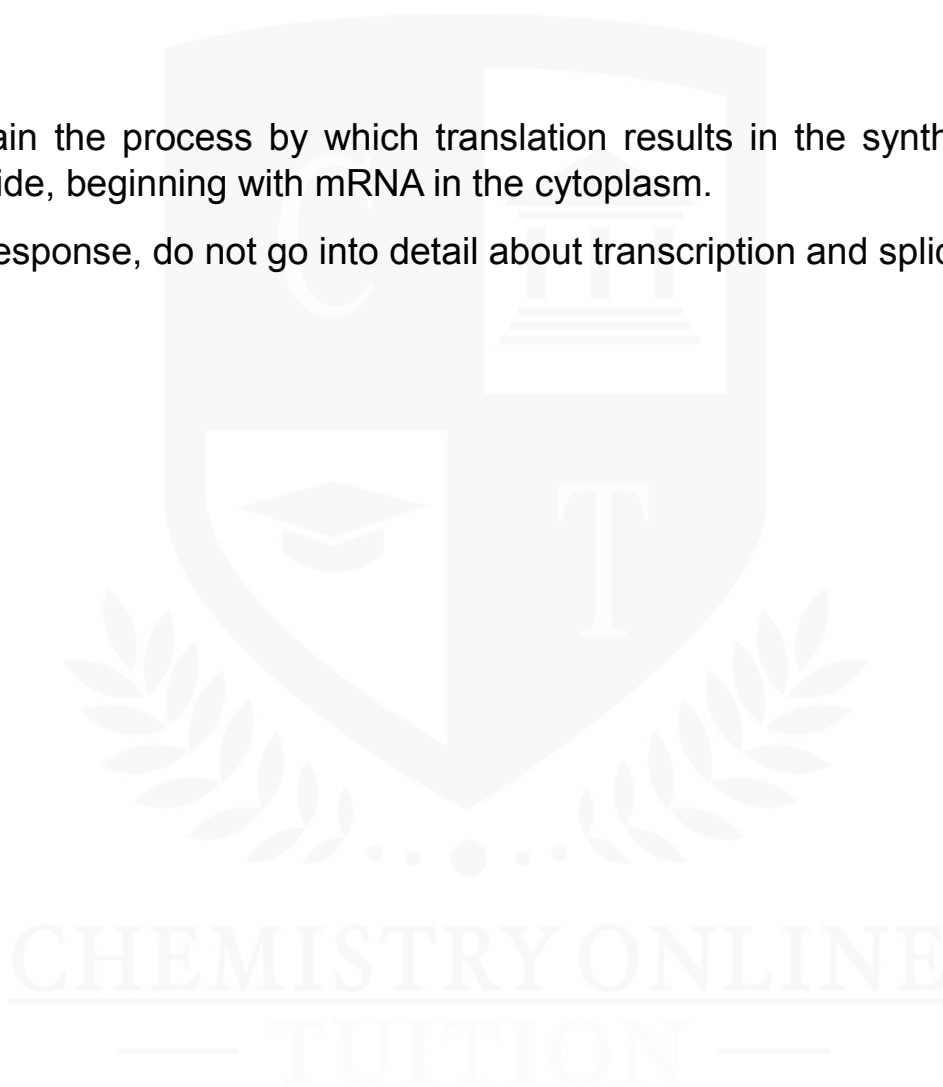
**(a)** What is a cell proteome? **(1)**

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**(b)** List the two structural variations between a transfer RNA (tRNA) and a messenger RNA (mRNA) molecule. **(2)**

**(c)** Explain the process by which translation results in the synthesis of a polypeptide, beginning with mRNA in the cytoplasm.

In your response, do not go into detail about transcription and splicing. **(5)**



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6.

The amino acids that each mRNA codon codes for are displayed in **Table 1**. Additionally, it displays a few characteristics of each amino acid R group.

**Table 1**

1st base	2nd base				3rd base
	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Leu		Stop	Stop	C
				Trp	A
					G
C	Leu	Pro	His	Arg	U
			Gin		C
					A
					G
A	Ile	Thr	Asn	Ser	U
	Met		Lys	Arg	C
					A
					G
G	Val	Ala	Asp	Gly	U
			Glu		C
					A
					G

**Key to the properties of the R group of each amino acid**

No overall charge
  Positively charged
  Negatively charged

**(b)** It is said that the genetic code is degenerate.

What does this mean? Provide an example from Table 1 to support your response. **(2)**



A scientist looked into how mutations affected a human enzyme's amino acid sequence. Mutations involving single base substitution are the cause of all these alterations in amino acids.

This enzyme is a 465 amino acid polypeptide.

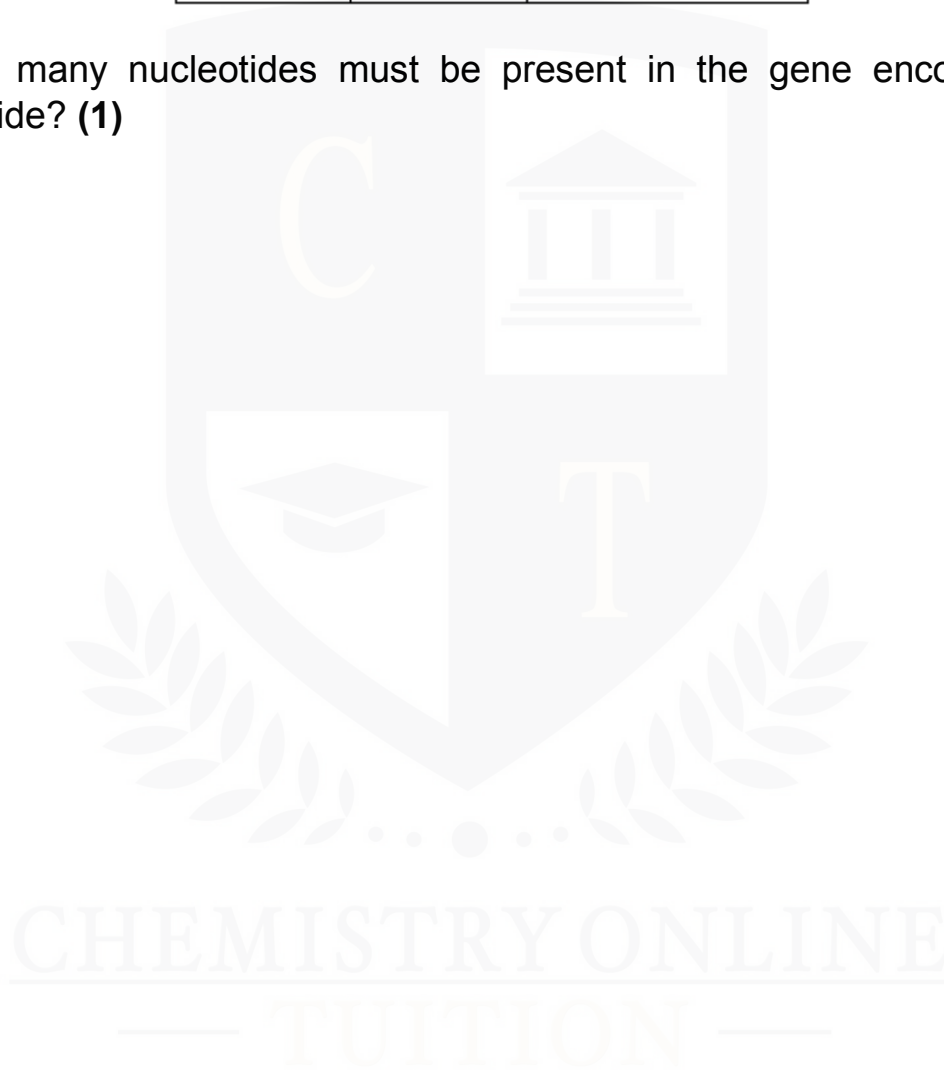
The outcomes of three base substitutions are displayed in **Table 2**.

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**Table 2**

Amino acid number	Correct amino acid	Amino acid inserted as a result of mutation
203	Val	Ala
279	Glu	Lys
300	Glu	Lys

**(c)** How many nucleotides must be present in the gene encoding this polypeptide? **(1)**



I am Sorry !!!!!



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