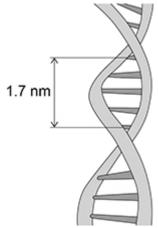
(2)

## Q1.

The diagram below shows part of a DNA molecule.



(a)	Name the type of bond between:					
	complementary base pairs					
	adjacent nucleotides in a DNA strand	(2)				
(b)	The length of a gene is described as the number of nucleotide base pairs it contains.					
	Use information in above diagram to calculate the length of a gene containing $4.38 \times 10^3$ base pairs.					
	Answer nm	(2)				
(c)	Describe <b>two</b> differences between the structure of a tRNA molecule and the structure of an mRNA molecule.	<b>\-</b> ,				
	1					
	2					

(d)	In a eukaryotic cell, the structure of the mRNA used in translation is different from the structure of the pre-mRNA produced by transcription.
	Describe <b>and</b> explain a difference in the structure of these mRNA molecules.
	(Total 8 mark
Q2.	
(a)	Describe how <b>one</b> amino acid is added to a polypeptide that is being formed at a ribosome during translation.
	·
	(

	2	
(.)	٠5.	
-	•	

(a)	Describe how mRNA is produced from an exposed template strand of
DNA.	

o <b>not</b> include DNA helicase or splicing in your answer.			

The table below shows **mRNA** codons for some amino acids.

Serine	Proline	Glycine	Threonine	Alanine
UCU	CCU	GGA	ACU	GCA
UCC	CCA	GGG	ACC	GCG

(c) **Figure 1** shows the DNA template nucleotide base sequence that determines the sequence of four amino acids.

## Figure 1

AGG CGT CCT GGA

Use information from the table and **Figure 1** to give the amino acid sequence determined by this sequence of nucleotides.

(1)

(3)

<b>b</b> )	Describe how a polypeptide is formed by translation of mRNA.	
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,	What is the growth ages of a callO
)	What is the proteome of a cell?
)	Give <b>two</b> structural differences between a molecule of messenger RNA (mRNA) and a molecule of transfer RNA (tRNA).
	1
	2
)	Starting with mRNA in the cytoplasm, describe how translation leads to the production of a polypeptide.
	Do <b>not</b> include descriptions of transcription and splicing in your answer.

	(5)
(Total 8 mar	rks)

## Q6.

**Table 1** shows mRNA codons and the amino acids coded for by each codon. It also shows some properties of the R group of each amino acid.

Table 1

1st base	2nd base				3rd base
101 2000	U	С	Α	G	oru pase
	Dho	he Ser	Tue	Cun	U
U	FILE		Tyt	Cys	С
U	Lou		Ston	Stop	Α
	Leu		Stop	Trp	G
			His	Arg	U
С	Leu	Dro			С
C	Leu	FIO	Pro Gin		Α
					G
		Inr	Asn	Ser	U
Α	A Ile		ASII	Sei	С
			Luc	٨٠٥	Α
			Lys	Arg	G
			Asp	Chr	U
C	Val	Δla			С
G	Val	Ala	Clu	Gly	Α
			Glu		G

Key	to the properties of the R group of each amino acid
	No overall change Positively charged Negatively charged
(b)	The genetic code is described as degenerate.
	What is meant by this? Use an example from <b>Table 1</b> to illustrate your answer.

(2)

•

A scientist investigated changes in the amino acid sequence of a human enzyme resulting from mutations. All these amino acid changes result from single base substitution mutations.

This enzyme is a polypeptide 465 amino acids long.

Table 2 shows the result of three of the base substitutions.

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) What is the minimum number of bases in the gene coding for this polypeptide?

Answer =	
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(1)

•					
(b)	Describe how mRNA is produced in a plant cell.				
(a)	Give the <b>two</b> types of molecule from which a ribosome is made.				
(b)	Describe the role of a ribosome in the production of a polypeptide. Do <b>not</b> include transcription in your answer.				

The table below shows the base sequence of part of a pre-mRNA molecule (c) from a eukaryotic cell.

Complete the table with the base sequence of the DNA strand from which this pre-mRNA was transcribed.

									DNA
Α	С	G	С	Α	U	U	Α	U	pre-mRNA

(1)

(d)	In a eukaryotic cell, the base sequence of the mRNA might be different from the sequence of the pre-mRNA.	
	Explain why.	
		(2)

(Total 7 marks)



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