



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

BIOLOGY

GENETICS, BIODIVERSITY & CLASSIFICATION

Level & Board	AQA (A-LEVEL)
TOPIC:	DNA, GENES & CHROMOSOMES
PAPER TYPE:	QUESTION PAPER - 1
TOTAL QUESTIONS	7
TOTAL MARKS	30

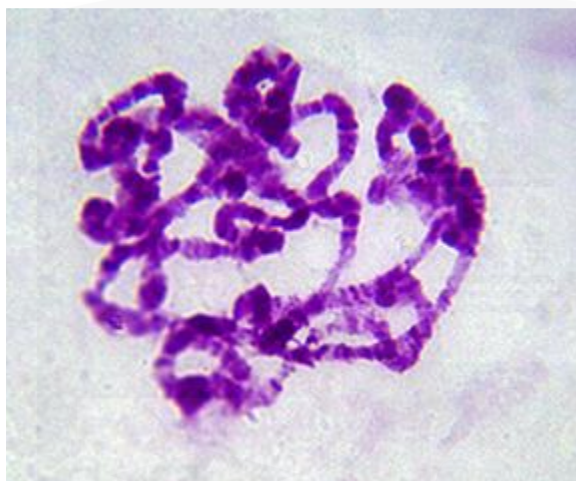
ChemistryOnlineTuition Ltd reserves the right to take legal action against any individual/ company/organization involved in copyright abuse.

DNA, Genes and Chromosomes - 1

1.

The topic of this inquiry is cell mitosis.

The organization of genetic material in a cell during prophase is depicted in the graphic below.



(a) Identify the permanent location on a DNA molecule that a gene occupies.

(1)

(b) Explain the process by which a gene codes for the synthesis of a polypeptide. In your response, do not provide any information on transcription or translation. (3)

I am Sorry !!!!!

2.

(a) Give the meaning of exon. (1)

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

Serine	Proline	Glycine	Threonine	Alanine
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)

3.

(a) Explain the formation of a phosphodiester bond in a DNA molecule between two nucleotides. (2)

(b) A given gene's two DNA strands are separated by 168 guanine nucleotides. The following equation illustrates the link between the quantities of guanine (G), adenine (A), thymine (T), and cytosine (C) bases in these two strands of DNA.

$$G \text{ equals } 4(A + T) - C.$$

Utilizing this data and your comprehension of DNA structure, determine the highest quantity of amino acids that this gene can encode.

Display your work. **(2)**

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!

(c) Identify the protein that a chromosome DNA is linked to. (1)

4.

(a) Fill in **Table 1** to illustrate the three ways that DNA in a prokaryotic cell and DNA in the nucleus of a plant cell differ from one another. (3)

Table 1

DNA in the nucleus of a plant cell	DNA in a prokaryotic cell
1	
2	
3	

(b) Researchers looked into the genetic variation among several sweet potato species. They looked at base sequences with several non-coding repetitions.

Give an explanation of "non-coding base sequences" and the genomic locations of non-coding multiple repeats. (2)

I am Sorry !!!!!

5.

(a) DNA can be found in a plant cell's chloroplast and nucleus.

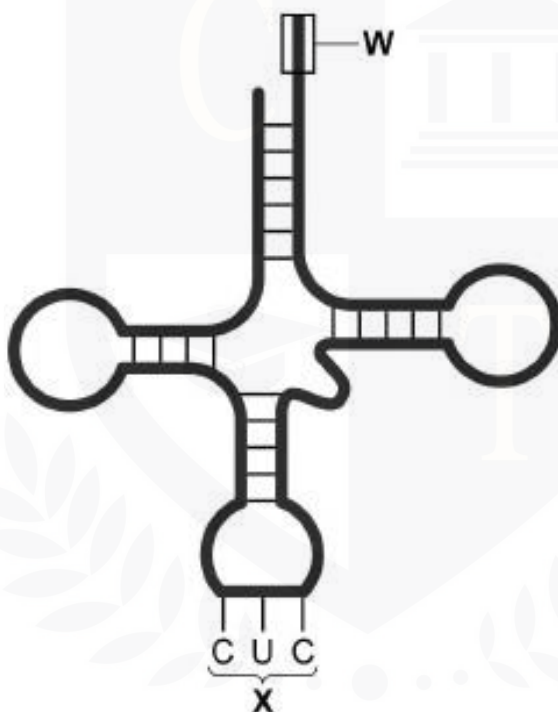
Name three ways that the DNA in a chloroplast and the DNA in the nucleus differ from each other. **(3)**



(b) Thymine is an organic base that is present in some DNA nucleotides but absent from RNA nucleotides. Instead of thymine, uracil is present in RNA nucleotides.

Please mention one more distinction between the structures of RNA and DNA nucleotides. **(1)**

A tRNA molecule is seen in the diagram.



(c) In the diagram, identify the structures designated W and X. (1)

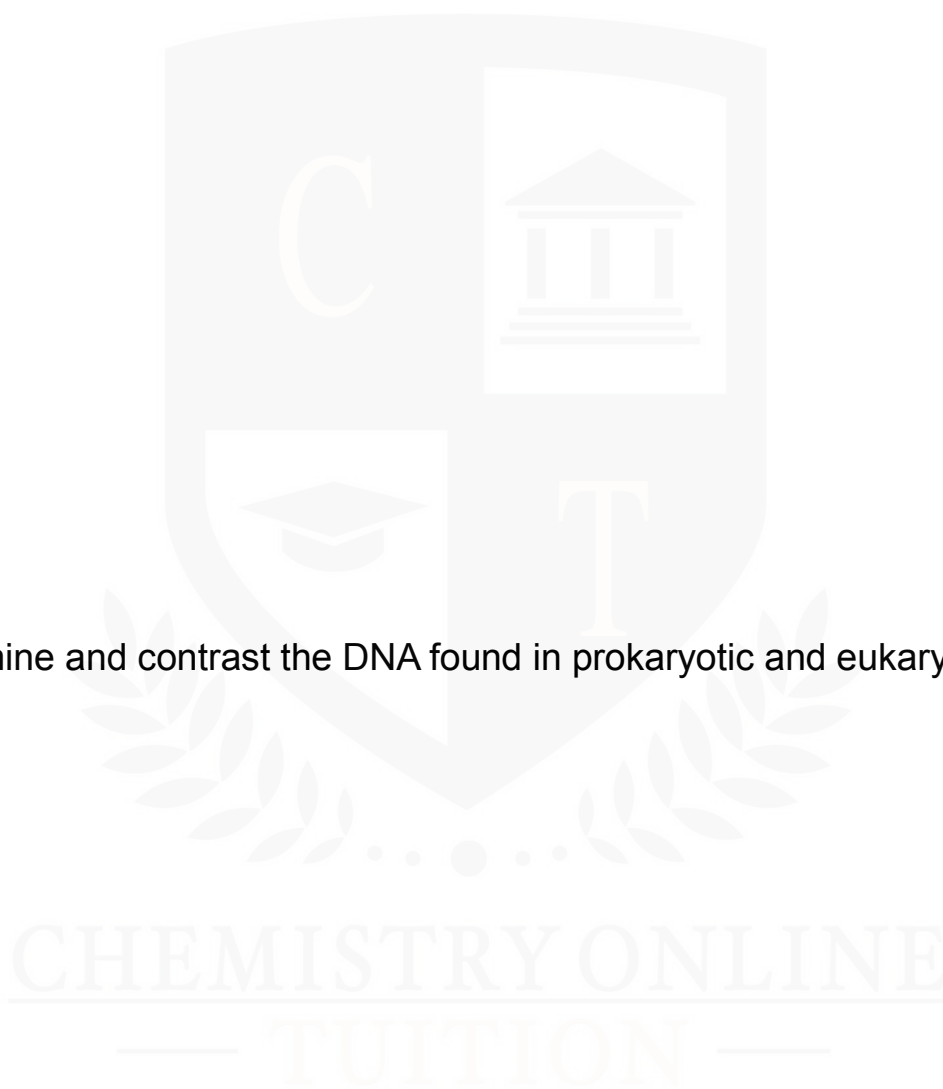
I am Sorry !!!!!

(d) Not every mutation in a gene nucleotide sequence results in a modification to a polypeptide structure.

Give two explanations for this. **(2)**

6.

(a) Examine and contrast the DNA found in prokaryotic and eukaryotic cells. **(5)**

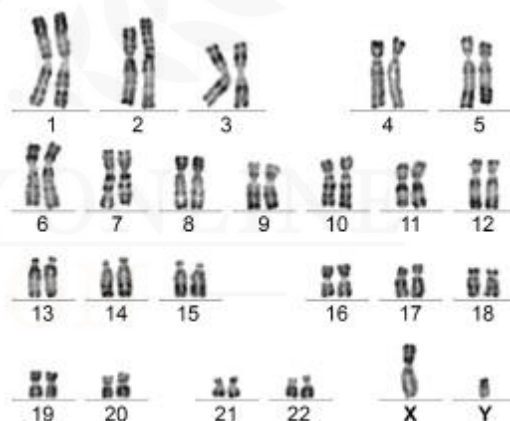


I am Sorry !!!!!

7.

All of the chromosomes found in a single human cell during mitosis are depicted in **Figure 1**.

A scientist dyed and captured images of the chromosomes. The scientist has placed the pictures of these chromosomes in homologous pairs in **Figure 2**.

Figure 1**Figure 2**

(a) The chromosomes seem striped because the black dye applied to them binds more strongly to certain regions of the chromosomes than to others.

Provide an example of how the chromosome's structure might vary along its length to cause the stain to bind more strongly in some places. **(1)**

(b) The black dye that has been given to the chromosomes causes some of their regions to bond more strongly than others, giving the appearance of stripes.

Give an example of how the stain might attach more firmly in some locations due to structural variations in the chromosome along its length. **(1)**

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!



DR. ASHAR RANA
M.B.B.S / MS. CHEMISTRY



- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, Math's and Biology Tutor

CONTACT INFORMATION FOR CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
 - International Phone/WhatsApp: 00442081445350
 - Website: www.chemistryonlinetuition.com
 - Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK