



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

BIOLOGY

THE CONTROL OF GENE EXPRESSION

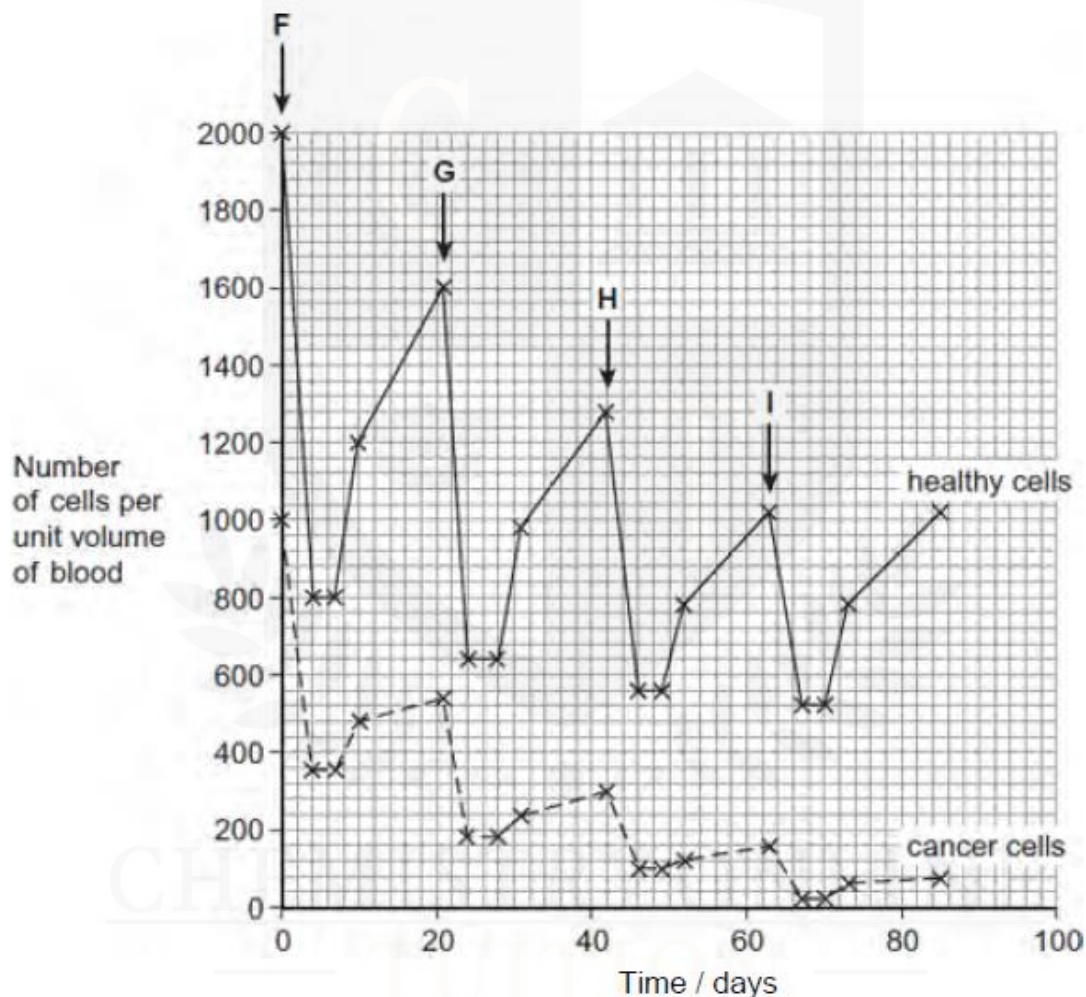
Level & Board	AQA (A-LEVEL)
TOPIC:	GENE MUTATIONS
PAPER TYPE:	QUESTION PAPER - 2
TOTAL QUESTIONS	6
TOTAL MARKS	31

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

Gene Mutation - 2

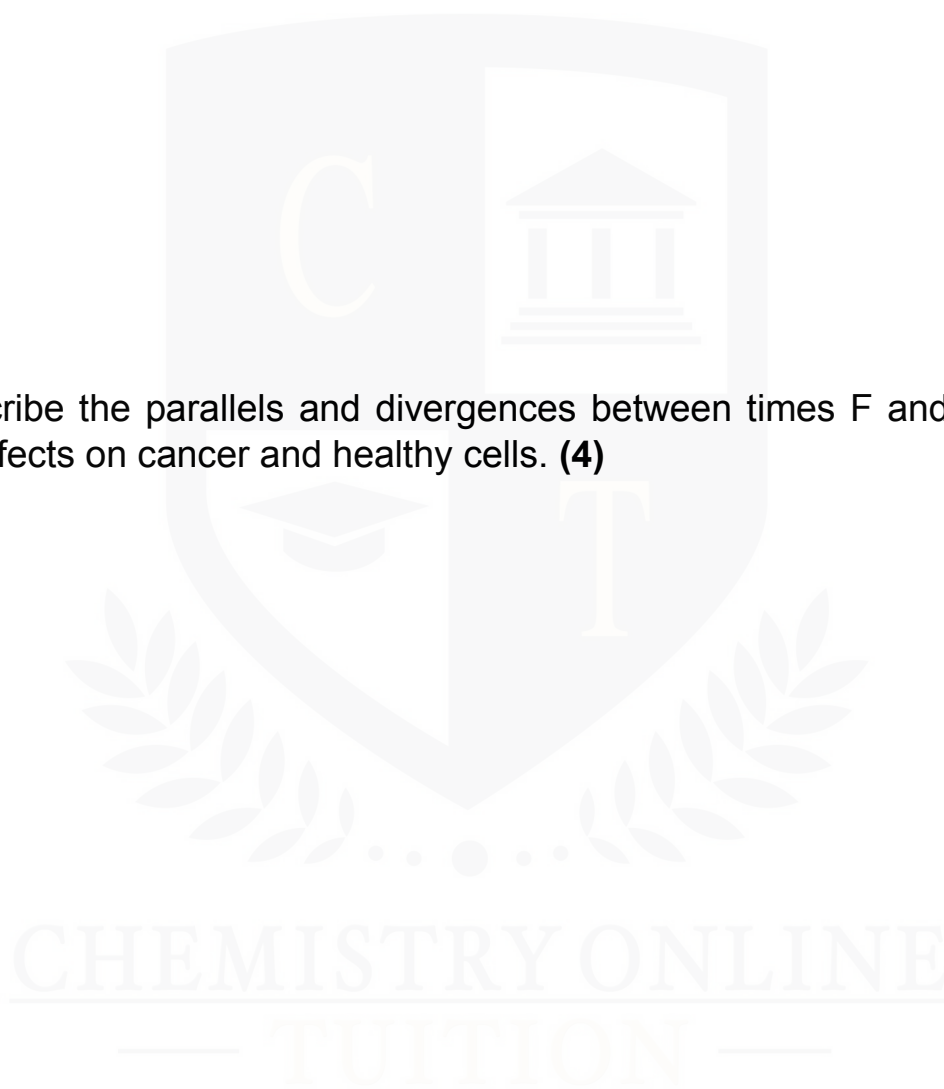
1.

A medication is used in chemotherapy to treat cancer. The medication stops dividing cells. The quantity of cancerous and healthy cells in a patient's blood throughout chemotherapy is depicted in the figure below. The patient's dosage was indicated by the arrows designated F through I.



(a) Determine the rate of death of healthy cells from days 42 to 46. (2)

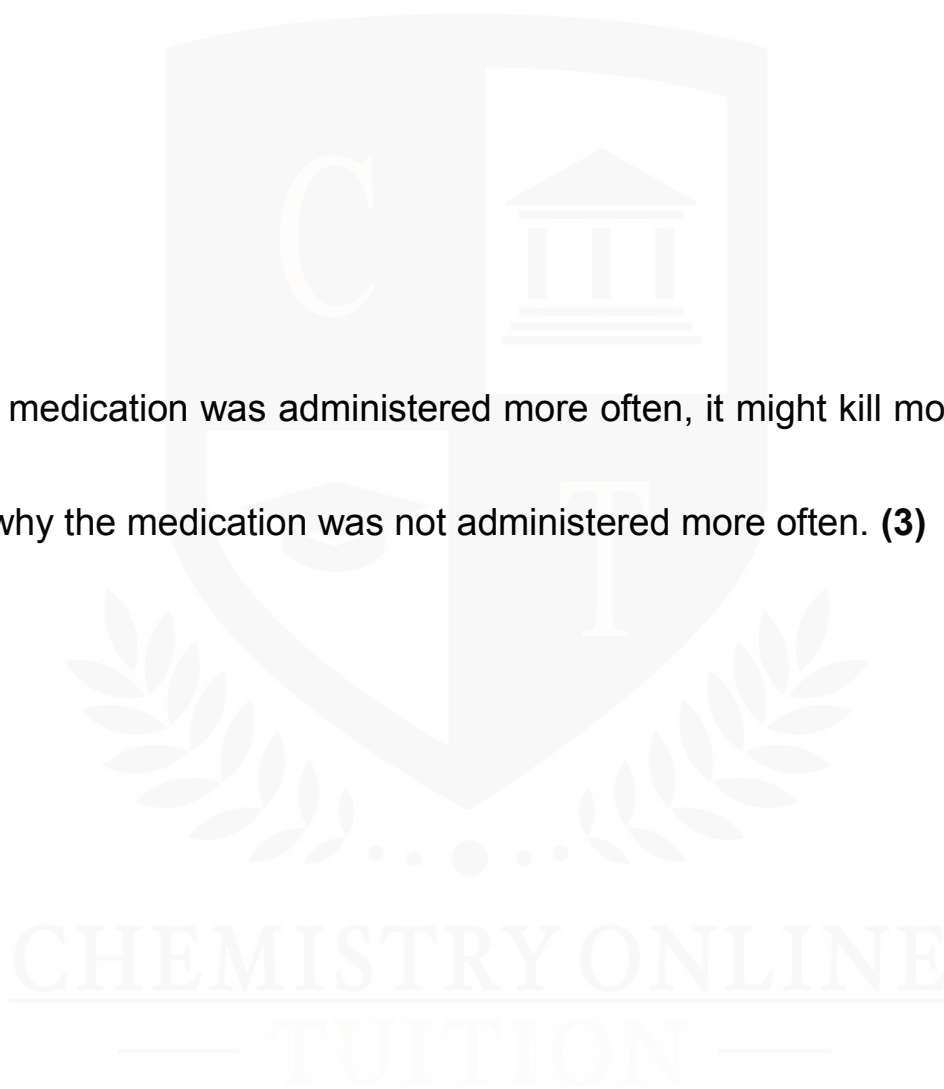
(b) Describe the parallels and divergences between times F and G in the drug's effects on cancer and healthy cells. **(4)**



I am Sorry !!!!!

(c) If the medication was administered more often, it might kill more cancer cells.

Explain why the medication was not administered more often. **(3)**



I am Sorry !!!!!

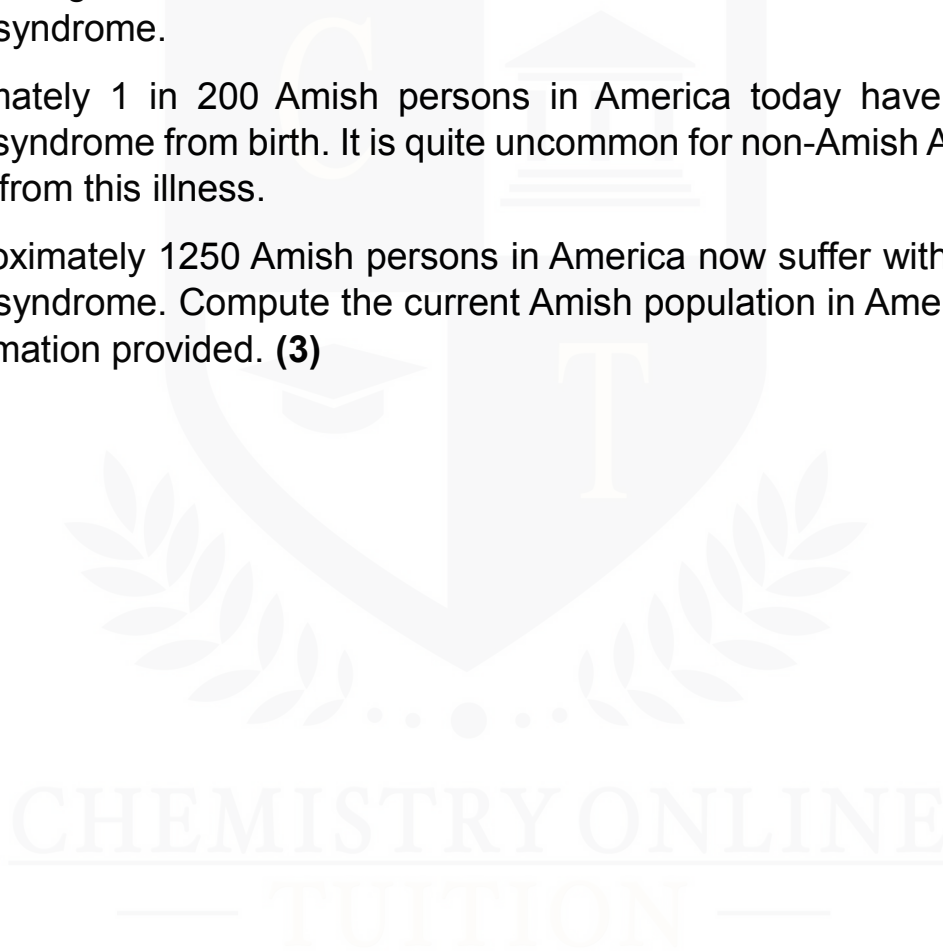
2.

America is home to a group of people known as the Amish. Thirty Swiss immigrants to the United States started this group many years ago. Generally speaking, Amish people do not marry outside of their community.

Ellis-van Creveld syndrome is a hereditary condition that affected one of the thirty Swiss founders. This condition is characterized by small stature, additional fingers, and toes. An error in one of the alleles causes Ellis-van Creveld syndrome.

Approximately 1 in 200 Amish persons in America today have Ellis-van Creveld syndrome from birth. It is quite uncommon for non-Amish Americans to suffer from this illness.

(a) Approximately 1250 Amish persons in America now suffer with Ellis-van Creveld syndrome. Compute the current Amish population in America using the information provided. **(3)**

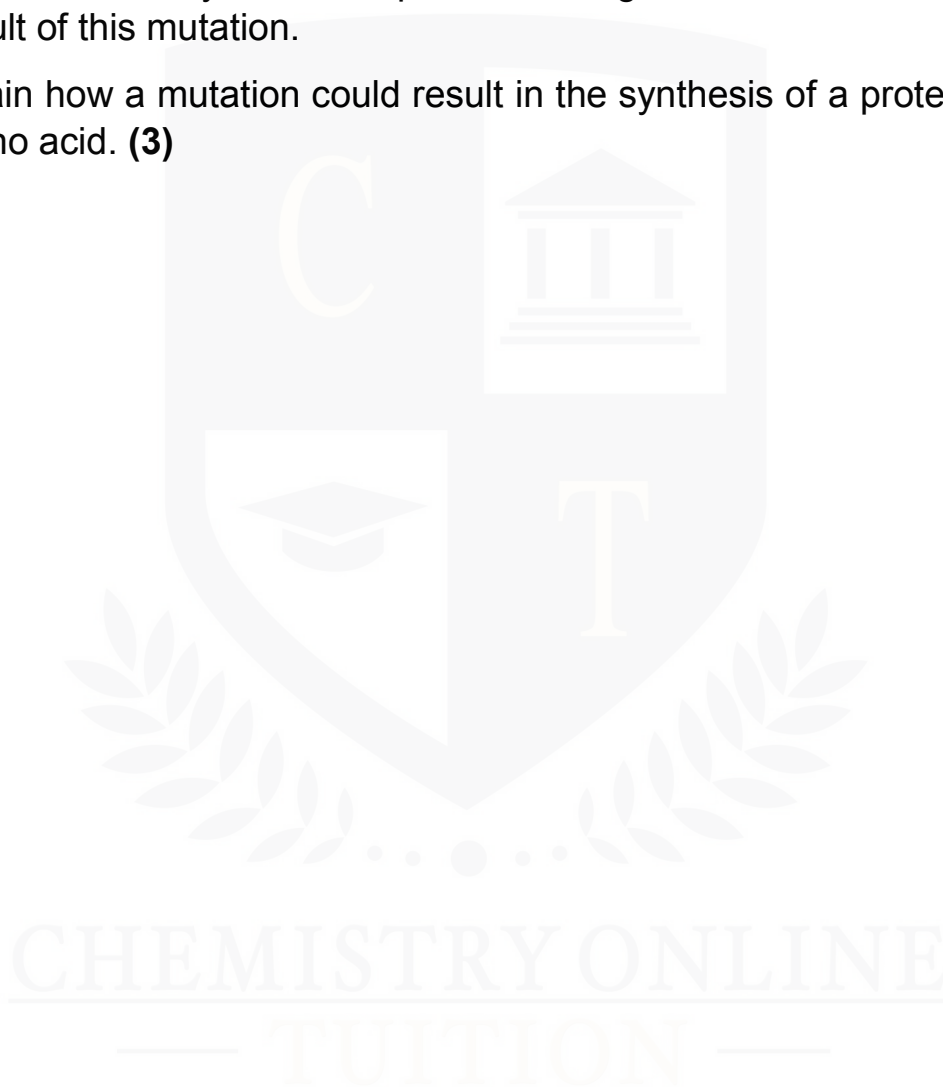


I am Sorry !!!!!

3.

EVC is the gene that is mutated to produce the defective allele that results in Ellis-van Creveld syndrome. A protein lacking one amino acid is produced as a result of this mutation.

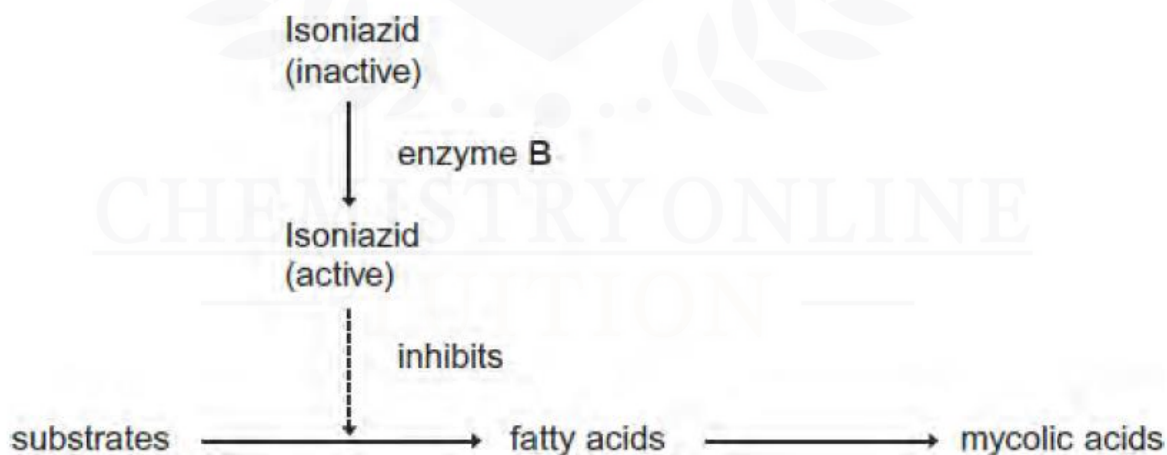
(a) Explain how a mutation could result in the synthesis of a protein lacking one amino acid. **(3)**



(b) Explain the possible link between the synthesis of a protein lacking one amino acid and the development of genetic disorders like Ellis-van Creveld syndrome. **(2)**

4.

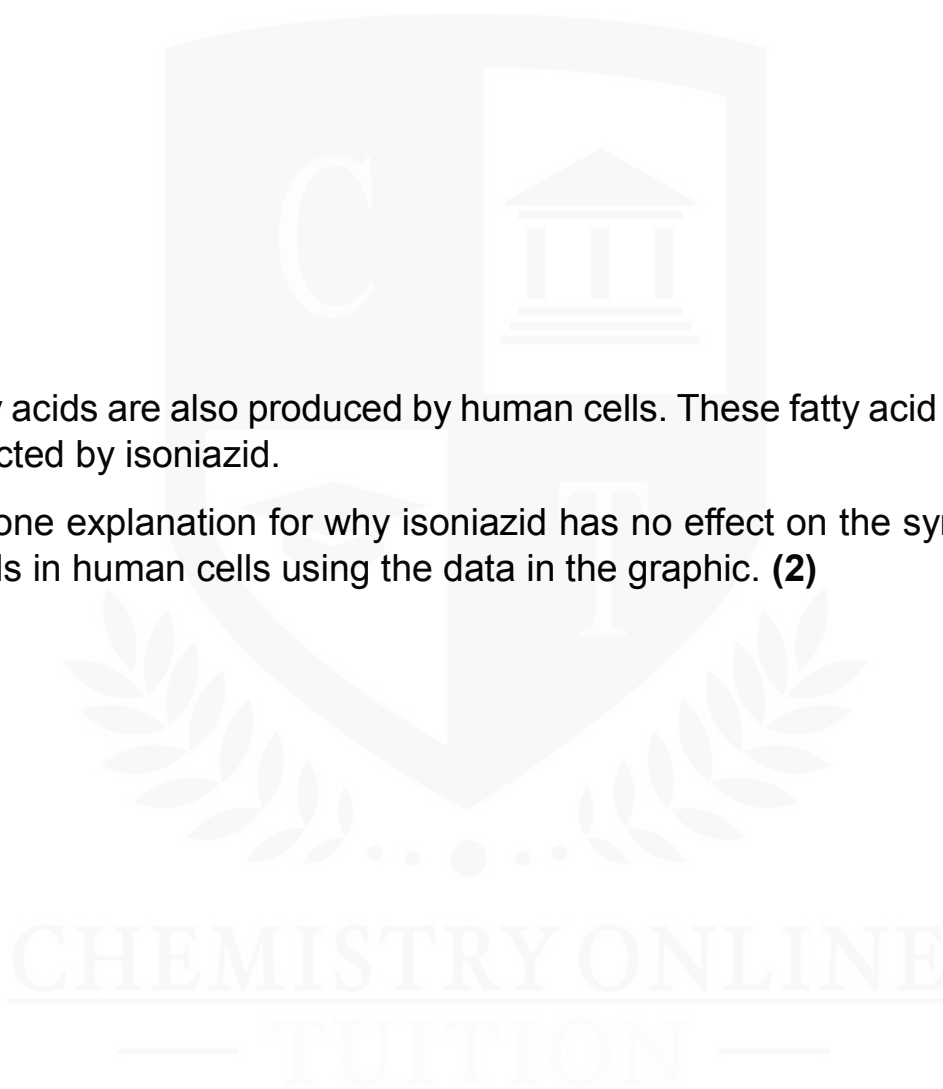
The tuberculosis-causing bacteria's cell wall contains chemicals called mycolic acids. Fatty acids are used to make mycolic acids. An antibiotic called isoniazid is used to treat tuberculosis. The figure illustrates how this antibiotic prevents the bacterium from producing mycolic acids.



(a) This bacterium undergoes osmotic lysis when treated with isoniazid. Make suggestions about how using the data in the diagram. (2)

(b) Fatty acids are also produced by human cells. These fatty acid synthesis is unaffected by isoniazid.

Provide one explanation for why isoniazid has no effect on the synthesis of fatty acids in human cells using the data in the graphic. **(2)**



I am Sorry !!!!!

(c) An enzyme that isn't functional could be produced if there is a mutation in the gene that codes for enzyme B. Describe how. **(2)**

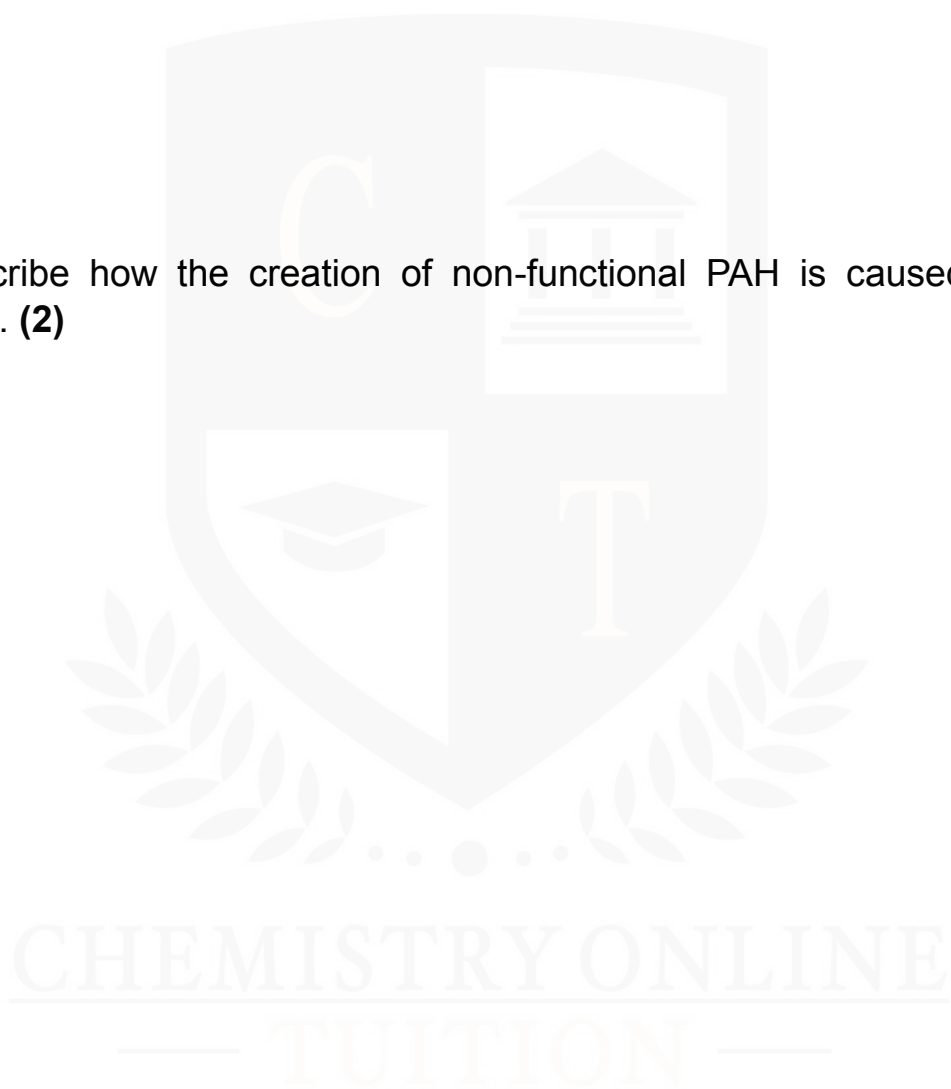
5.

The illness known as phenylketonuria is brought on by mutations in the gene that codes for the PAH enzyme. A portion of the DNA nucleotide sequence coding for PAH is included in the table. Additionally, it demonstrates a mutation in this sequence that results in the synthesis of PAH that is inactive.

DNA base sequence coding for PAH	C	A	G	T	T	C	G	C	T	A	C	G
DNA base sequence coding for non-functioning PAH	C	A	G	T	T	C	C	C	T	A	C	G

(a) What is the most amino acids that this base sequence can code for? **(2)**

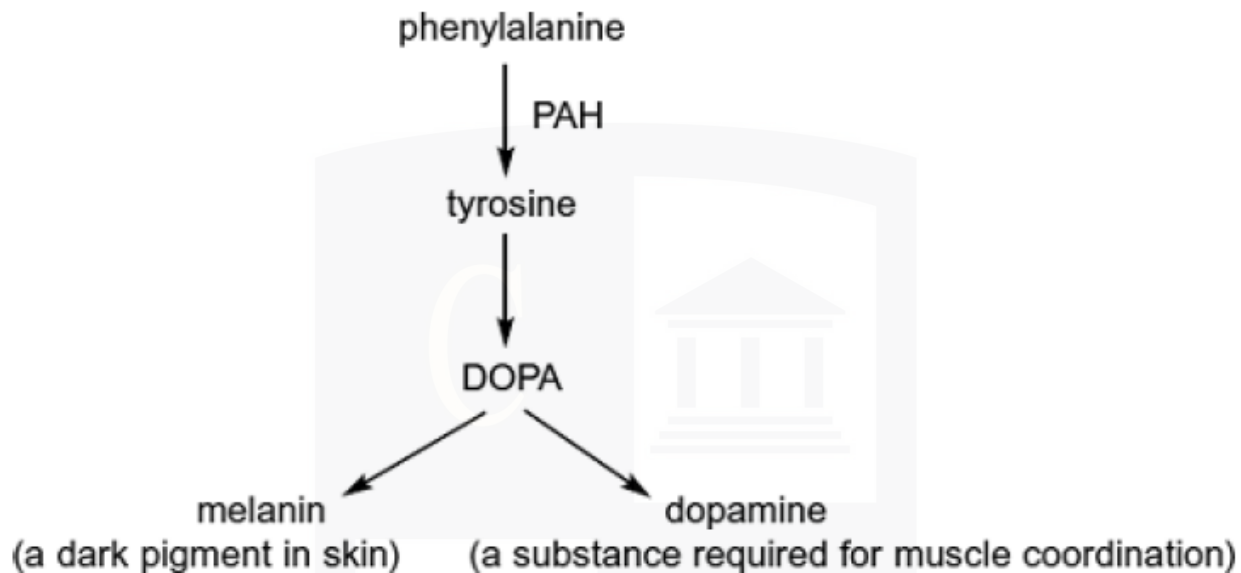
(b) Describe how the creation of non-functional PAH is caused by this mutation. **(2)**



I am Sorry !!!!!

6.

At the beginning of two enzyme-controlled pathways, PAH catalyzes a reaction. These paths are depicted in the diagram.



(a) Give two symptoms that a person who develops non-functioning PAH might exhibit using the information in the diagram. (2)

CHEMISTRY ONLINE
— TUITION —

I am Sorry !!!!!

(b) Originally, a single community in central Asia carried the phenylketonuria-causing mutation. These days, it is present in a wide range of Asian communities. Provide a hypothesis as to how this mutation might have propagated. **(2)**



I am Sorry !!!!!



DR. ASHAR RANA



**CHEMISTRY ONLINE
— TUITION —**

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, and Math's 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