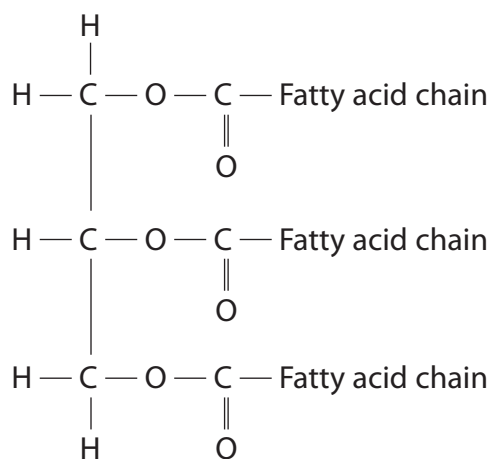


1 Triglycerides are lipids that are an important source of energy for the body. Triglycerides are broken down and reassembled in the body.

(a) The diagram below shows the structure of a triglyceride.



In the space below, draw a diagram to show the molecules produced from the complete hydrolysis of the triglyceride.

(3)

(b) Suggest the possible consequence of a very low fat diet for someone who has a very active lifestyle.

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*(c) Groups of enzymes help the body to break down and process triglycerides. Abnormalities in these enzymes can lead to the build-up of lipids that would have been broken down.

Explain why a gene mutation can result in an enzyme that is unable to break down lipids.

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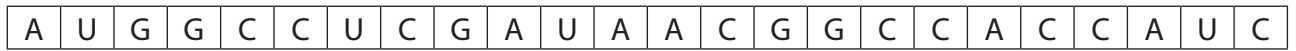
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(Total for Question 1 = 10 marks)

2 The diagram below shows the sequence of bases in a short length of mRNA.



(a) (i) Place a cross ☒ in the box next to the letter that shows the DNA sequence which is complementary to the **first four** of these bases.

(1)

A

T	A	C	C
---	---	---	---

B

T	U	C	C
---	---	---	---

C

U	A	C	C
---	---	---	---

D

U	T	C	C
---	---	---	---

(ii) State the maximum number of amino acids coded for by this length of mRNA.

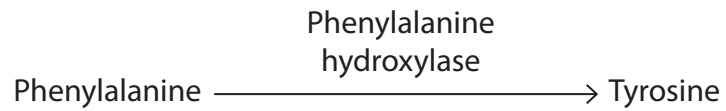
(1)

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(b) Name the process by which mRNA is formed in the nucleus.

(1)

(c) Phenylalanine is an amino acid found in many proteins in the human diet.

In most people it is converted to the amino acid tyrosine by an enzyme, as shown in the diagram below.



Phenylketonuria is the result of a gene mutation.

People with phenylketonuria cannot convert phenylalanine to tyrosine.

Explain why people with this gene mutation cannot convert phenylalanine to tyrosine.

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(d) Explain why a gene mutation involving the replacement of one base with another has less effect than the loss of a base.

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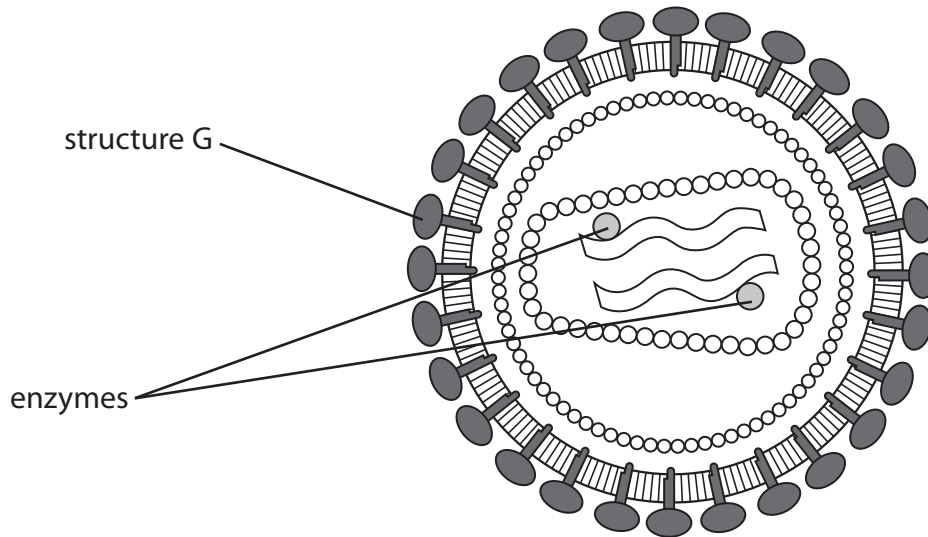
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(Total for Question 2 = 9 marks)

3 Anti-viral drugs have been developed to treat patients infected with Human Immunodeficiency Virus (HIV).

The diagram below shows the structure of HIV.



(a) Explain how **structure G** enables HIV to infect human cells.

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(b) Some anti-viral drugs used to treat patients infected with HIV are inhibitors of enzymes found within HIV.

(i) Describe the structure of an enzyme.

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*(ii) Suggest how these anti-viral drugs would work in the treatment of patients infected with HIV.

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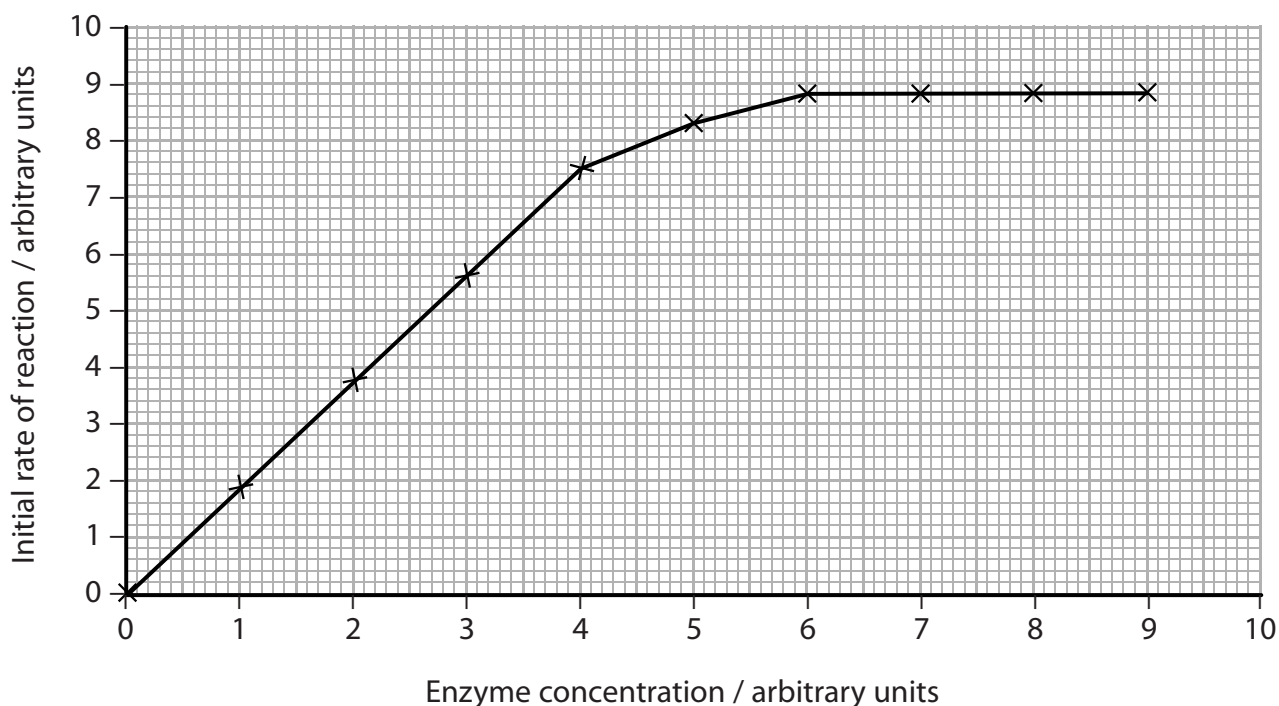
(Total for Question 3 = 11 marks)

4 Enzymes are biological catalysts made of protein.

(a) Proteins are chains of amino acids. In the space below draw the structure of **one** amino acid.

(3)

(b) The graph below shows the effect of changing the enzyme concentration on the initial rate of a reaction.



(i) Explain the effect of changing enzyme concentration on the initial rate of reaction.

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(ii) Describe an experiment that could be carried out to investigate the effect of enzyme concentration on the initial rate of reaction.

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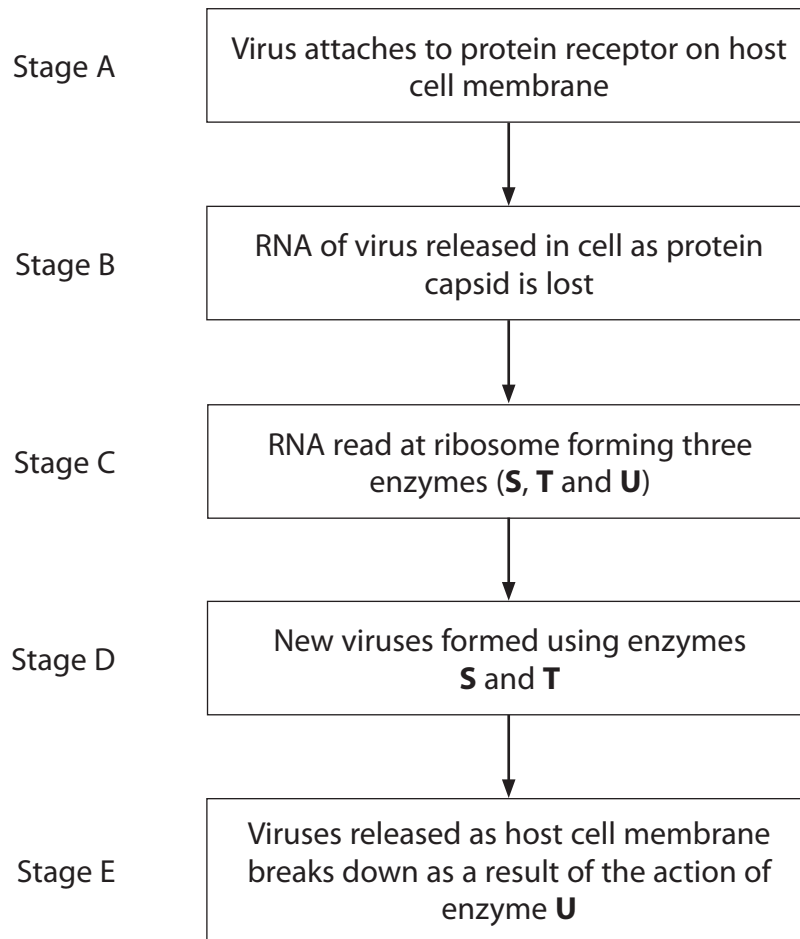
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(Total for Question 4 = 10 marks)

5 The common cold is a disease caused by a variety of viruses.

The flow diagram below describes how common cold viruses attack the cells on the inside of the nose.



(a) Common cold viruses infect only the cells inside the nose.

(i) Suggest why common cold viruses cannot infect cells if they land on unbroken skin.

(2)

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(ii) Suggest why common cold viruses cannot infect cells if they enter the blood through a cut in the skin.

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(b) Compare the action of the RNA in the common cold virus with that found in HIV.

(2)

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(c) At Stage C, three enzymes are formed.

(i) Suggest why two of these enzymes, **S** and **T**, are needed at Stage D.

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(ii) Suggest how enzyme **U** might catalyse the breakdown of the host cell membrane at Stage E.

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(Total for Question 5 = 11 marks)