Lisachem Materials

Chemistry Physics Biology Psychology

VCE BIOLOGY 2006 TRIAL EXAM Year 12 Unit 3

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Time allowed 90 minutes
Total Marks 75

QUESTION AND ANSWER BOOKLET
Structure of Booklet

Section	Number of Questions	Number of Questions to be Answered
A	25	25
B	7	7

Answer Multiple Choice questions by circling the appropriate letter on the answer sheet attached. Use space provided below question in Short Answer section.

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Student Name.....

VCE Biology 2006 Year 12 Trial Exam Unit 3
Student Answer Sheet

Answer each Multiple Choice question by circling the appropriate letter. Use a pencil. If you make a mistake erase and enter the correct answer. Marks will not be deducted for incorrect answers.
Write your answers to Short Answer Section in the space provided directly below the question.

Multiple Choice

Question 1	A	B	C	D
Question 2	A	B	C	D
Question 3	A	B	C	D
Question 4	A	B	C	D
Question 5	A	B	C	D
Question 6	A	B	C	D
Question 7	A	B	C	D
Question 8	A	B	C	D
Question 9	A	B	C	D
Question 10	A	B	C	D
Question 11	A	B	C	D
Question 12	A	B	C	D
Question 13	A	B	C	D
Question 14	A	B	C	D
Question 15	A	B	C	D
Question 16	A	B	C	D
Question 17	A	B	C	D
Question 18	A	B	C	D
Question 19	A	B	C	D
Question 20	A	B	C	D
Question 21	A	B	C	D
Question 22	A	B	C	D
Question 23	A	B	C	D
Question 24	A	B	C	D
Question 25	A	B	C	D

VCE Biology 2006 Year 12 Trial Exam Unit 3

Multiple Choice Section

The following information relates to Questions 1 and 2.
Table 1 shows the chemical elements present in three biomacromolecules from a plant cell. The three molecules are a protein, a nucleic acid and a polysaccharide.

Table 1

Biomacromolecule	Carbon	Hydrogen	Oxygen	Nitrogen	Phosphorus	Sulphur
P	Present	Present	Present	Absent	Absent	Absent
Q	Present	Present	Present	Present	Present	Absent
R	Present	Present	Present	Present	Absent	Present

Question 1
From Table 1, it can be concluded that

A. P is a protein, Q is a nucleic acid and R is a polysaccharide.
B. P is a nucleic acid, Q is a protein and R is a polysaccharide.
C. P is a polysaccharide, Q is a nucleic acid and R is a protein.
D. P is a nucleic acid, Q is a polysaccharide and R is a protein.

Question 2
The polysaccharide could be

A. glucose or sucrose.
B. cellulose or starch.
C. sucrose or cellulose.
D. glucose or starch.

Question 3
The Calvin Cycle occurs

A. on the membranes of the grana.
B. in the cytoplasm of animal cells.
C. in the endoplasmic reticulum of plant cells.
D. in the stroma of the chloroplasts.

Question 4
In humans, the core body temperature is 37 ºC and is under homeostatic control. Figure 1 shows the body's response to an increase in core temperature.

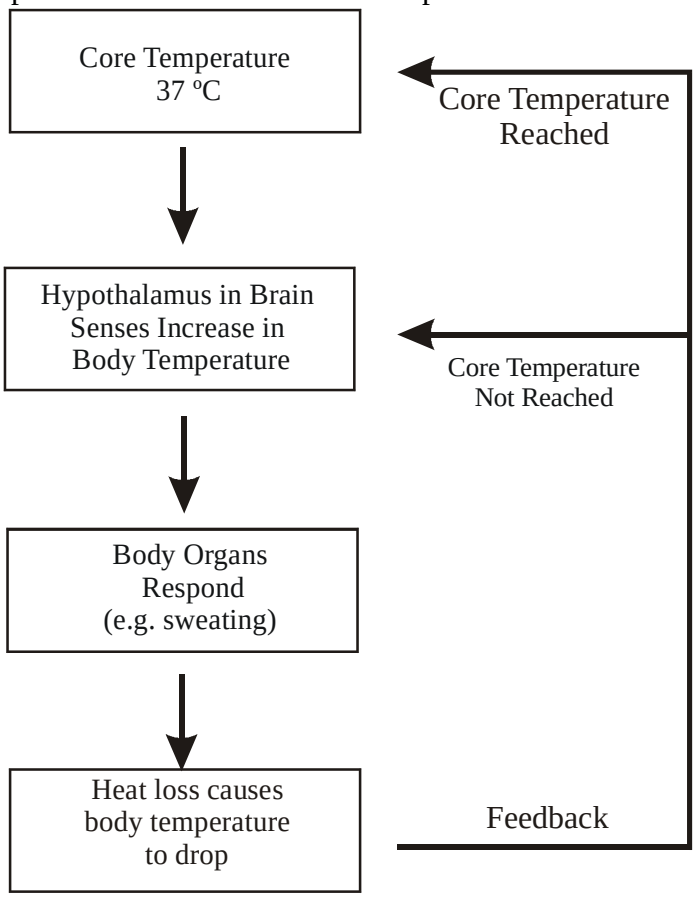


Figure 1

According to Figure 1,

A. body organs are acting as receptors.
B. the hypothalamus is acting as an effector.
C. if the core temperature is not reached, positive feedback has occurred.
D. if the core temperature is not reached, sweating will continue.

Question 5
Figure 2 shows a molecule present in all cells.

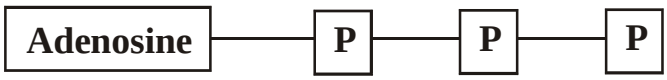


Figure 2

There is a net gain of this molecule during

A. the conversion of pyruvate to lactic acid during anaerobic respiration.
B. protein synthesis.
C. the light dependent reactions of photosynthesis.
D. the light independent reactions of photosynthesis.

Questions 6 and 7 relate to the following information.
Table 2 lists some of the functions of four different white blood cells.

Table 2

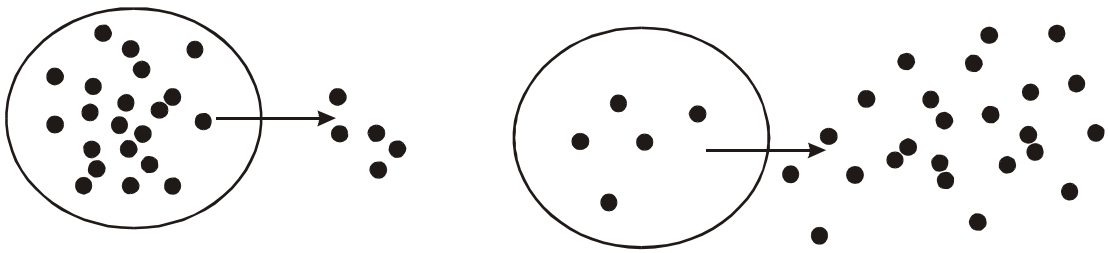
– does not perform function
+ does perform function

Function	White Blood Cell **1**	White Blood Cell **2**	White Blood Cell **3**	White Blood Cell **4**
Antibody Production	–	+	–	–
Phagocytosis	–	–	–	+
Antigen Recognition	+	+	–	–
Cytotoxicity	+	–	+	+

Question 6
The cell most likely to be a macrophage is
A. White Blood Cell 1.
B. White Blood Cell 2.
C. White Blood Cell 3.
D. White Blood Cell 4.

Question 7
Two of the cells are part of the specific immune system. These cells would be
A. White Blood Cells 1 and 2.
B. White Blood Cells 2 and 3.
C. White Blood Cells 3 and 4.
D. White Blood Cells 2 and 4.

Question 8
Figure 3 shows the movement of a molecule from inside the cell to outside the cell in two different cells. The number of dots inside and outside the two cells is a measure of the relative concentration of the molecules.



Cell A Cell B

Figure 3

From Figure 3, it can be concluded that respiratory energy is required to move the molecules out of

A. Cell A only.
B. Cell B only.
C. Both Cells A and B.
D. Neither Cell A nor B.

Question 9
Many parasites are difficult to treat with drugs because their cells are very similar to human cells. A recent discovery has found that the parasite that causes the disease leishmaniasis does not use glucose as an energy source but another sugar called mannose. It also stores mannose in the form of a carbohydrate called mannan. Scientists want to design a drug that kills this parasite but has little effect on human cells.

One way to achieve this would be to design a drug that

A. damages cell membranes.
B. prevents mannose being converted to glucose.
C. prevents the synthesis of mannan from mannose.
D. inhibits DNA replication.

The following information relates to Questions 10 and 11.
Figure 4 shows the release of a hormone from a mammalian body cell and its interaction with two other body cells.

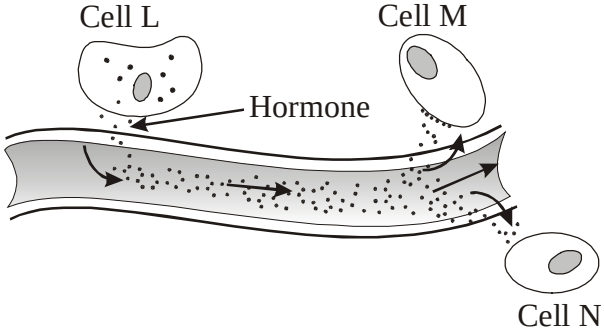


Figure 4

Question 10
From the information given in Figure 4, it can be concluded that

A. Cell M is a target cell while Cell N is a non target cell.
B. Cell L is a target cell while Cell M is a non target cell.
C. Cell N is a target cell while Cell M is a non target cell.
D. Cell L is a target cell while Cell N is a non target cell.

Question 11
From Figure 4 and your own knowledge it can be concluded that

A. hormones come into contact with target cells but not non target cells.
B. Cells L, M and N are all endocrine cells.
C. hormones are secreted into ducts to be transported around the body.
D. only target cells have receptors for the hormone.

Question 12
A vaccine was being developed for a particular viral disease in sheep. Which of the following describes the most appropriate scientific method in determining whether the vaccine is effective?

A. Vaccinate 1000 sheep and expose all to the disease.
B. Vaccinate 1000 sheep but only expose 500 to the disease.
C. Vaccinate 500 sheep, do not vaccinate the other 500 and expose only the vaccinated sheep to the disease.
D. Vaccinate 500 sheep, do not vaccinate the other 500 and expose all the sheep to the disease.

Question 13
The aerobic phase of respiration occurs in the mitochondria. What are the names of the two main stages?
A. Krebs Citric Acid Cycle and Glycolysis.
B. Glycolysis and the Electron Transport Chain.
C. Krebs Citric Acid Cycle and the Electron Transport Chain.
D. Glycolysis and Fermentation.

Question 14
Which of the following yields the greatest amount of ATP during aerobic respiration?
A. Krebs Citric Acid Cycle.
B. The Electron Transport Chain.
C. Fermentation.
D. Glycolysis.

The following information relates to Questions 15 to 17.
Lysosomes are small membrane-bound organelles found in all eukaryotic cells. They break down a range of unwanted molecules by the use of a variety of enzymes. The pH of a lysosome is quite acidic (about 4.0) compared to the cytoplasm (about 7.5). The low pH is necessary for the optimum functioning of the enzymes within the lysosomes. One of these enzymes is acid phosphatase. To maintain a low pH, lysosomes employ a proton pump. This moves hydrogen ions into the lysosome. See Figure 5.

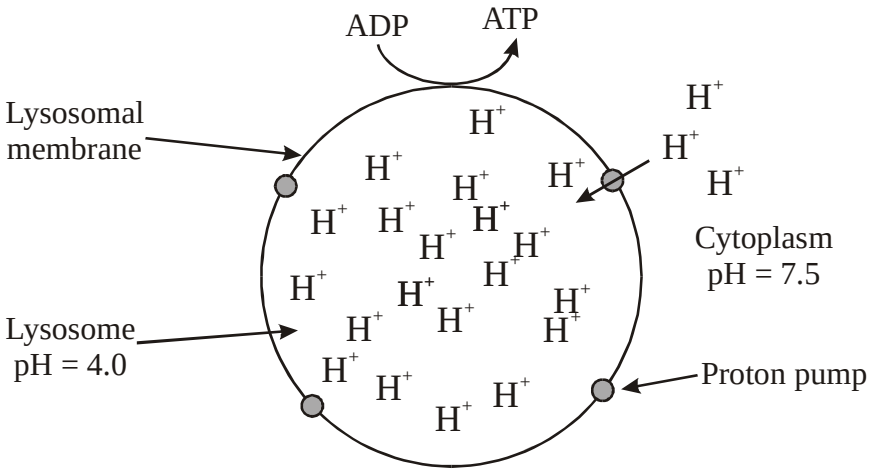


Figure 5

Question 15.
If some acid phosphatase leaked into the cytoplasm of the cell, you would

A. expect large scale damage to the cell due to the acid phosphatase becoming active in the cytoplasm.
B. expect minimal damage to the cell since the pH of the cytoplasm is well above the optimum for acid phosphatase.
C. not expect any change to occur to the tertiary structure of the enzyme.
D. expect some changes to occur to the primary structure of the enzyme.

Question 16
The process by which hydrogen ions move into the lysosome is an example of

A. osmosis.
B. facilitated diffusion.
C. endocytosis.
D. active transport.

Question 17
Inside a lysosome, it would be expected that

A. proteases would digest polynucleotides.
B. lipases would digest cholesterol.
C. nucleases would digest carbohydrates.
D. amylases would digest polypeptides.

The following information relates to Questions 18 and 19.
Figure 6 shows some of the processes involved in cellular metabolism.

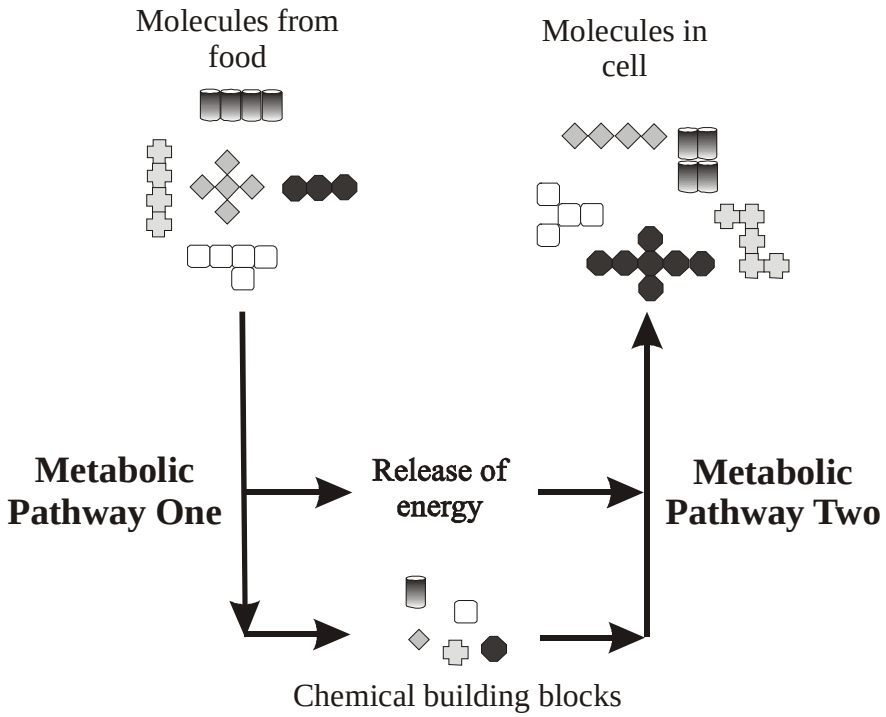


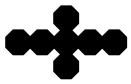
Figure 6

Question 18
In Figure 6,

A. Metabolic Pathways One and Two are both anabolic pathways.
B. Metabolic Pathways One and Two are both catabolic pathways.
C. Metabolic Pathway One is a catabolic pathway, while Metabolic Pathway Two is an anabolic pathway.
D. Metabolic Pathway One is an anabolic pathway, while Metabolic Pathway Two is a catabolic pathway.

Question 19
In figure 6, a monomer would best be represented by

A. 

B. 

C. 

D. 

The following information relates to Questions 20 and 21.
Figure 7 shows a molecule from an animal cell.

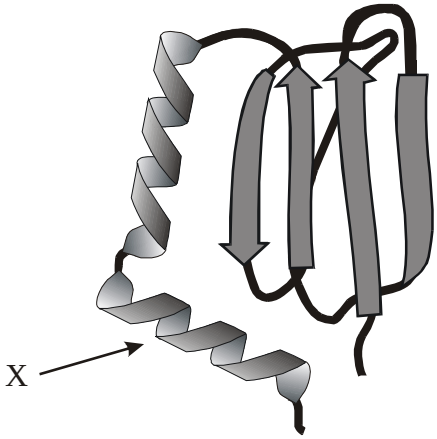


Figure 7

Question 20
The part labelled X in Figure 7 is

A. a random coil.
B. a double helix.
C. a beta sheet.
D. an alpha helix.

Question 21
The molecule in Figure 7 could be

A. a steroid hormone.
B. a polysaccharide on the surface of the cell membrane.
C. a polypeptide from an intracellular enzyme.
D. an amino acid.

The following information relates to Questions 22 to 24.
In the blood condition known as Immune Thrombocytopenic Purpura (ITP), the immune system destroys platelets in the blood but does not damage the cells in the bone marrow that manufacture them. Since the blood platelets are always low in number, the cells in the bone marrow of ITP sufferers are continually stimulated in a feedback loop.

Question 22
Sufferers of ITP would be expected to
A. suffer from bleeding episodes that are difficult to stop.
B. be prone to the formation of blood clots in the arteries and veins.
C. have a low white blood cell count in the bloodstream.
D. have enlarged lymph nodes.

Question 23
ITP is an example of
A. an allergic disorder.
B. a hypersensitivity.
C. an immune deficiency.
D. an autoimmune disease.

Question 24
The bone marrow of a sufferer of ITP would be expected to produce
A. more platelets than a non-sufferer of ITP.
B. the same number of platelets as a non-sufferer of ITP.
C. less platelets than a non-sufferer of ITP.
D. different platelets to prevent them being destroyed by the immune system.

Question 25
Figure 8 shows some of the structural parts of the lymphatic system. Only some of the structural parts of this system are shown.
Which of the following alternatives accurately names the structural parts of this system that are shown in Figure 8, as well as some of the parts of this system that are not shown?

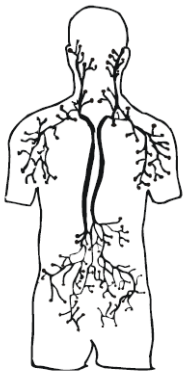


Figure 8

Alternative	Structural Parts of System SHOWN in Figure 8	Structural Parts of System NOT SHOWN in Figure 8
A	Lymph Vessels, Lymph Nodes	Thymus, Thyroid Gland
B	Blood Vessels, Lymph Vessels	Thymus, Lymph Nodes
C	Groin, Lymph Nodes	Bone Marrow, Tonsils
D	Lymph Nodes, Lymph Vessels	Spleen, Bone Marrow

Short Answer Section

Question 1

Insulin is a protein hormone secreted by the beta cells of the pancreas. It lowers glucose levels in the bloodstream.

a. To which system of the body do beta cells belong?

_____(1 mark)

b. What is a hormone?

_____

_____

_____

(1 mark)

c. The types of insulin produced by various species of mammal differ mainly in their primary structure. Explain what this statement means.

_____

_____

_____

(1 mark)

Insulin is a small protein but when it is first made in the pancreas, it is part of a larger protein called preproinsulin. The formation of the larger protein is necessary to allow insulin to fold properly. Figure 9 shows how preproinsulin is first modified into proinsulin and finally to insulin.

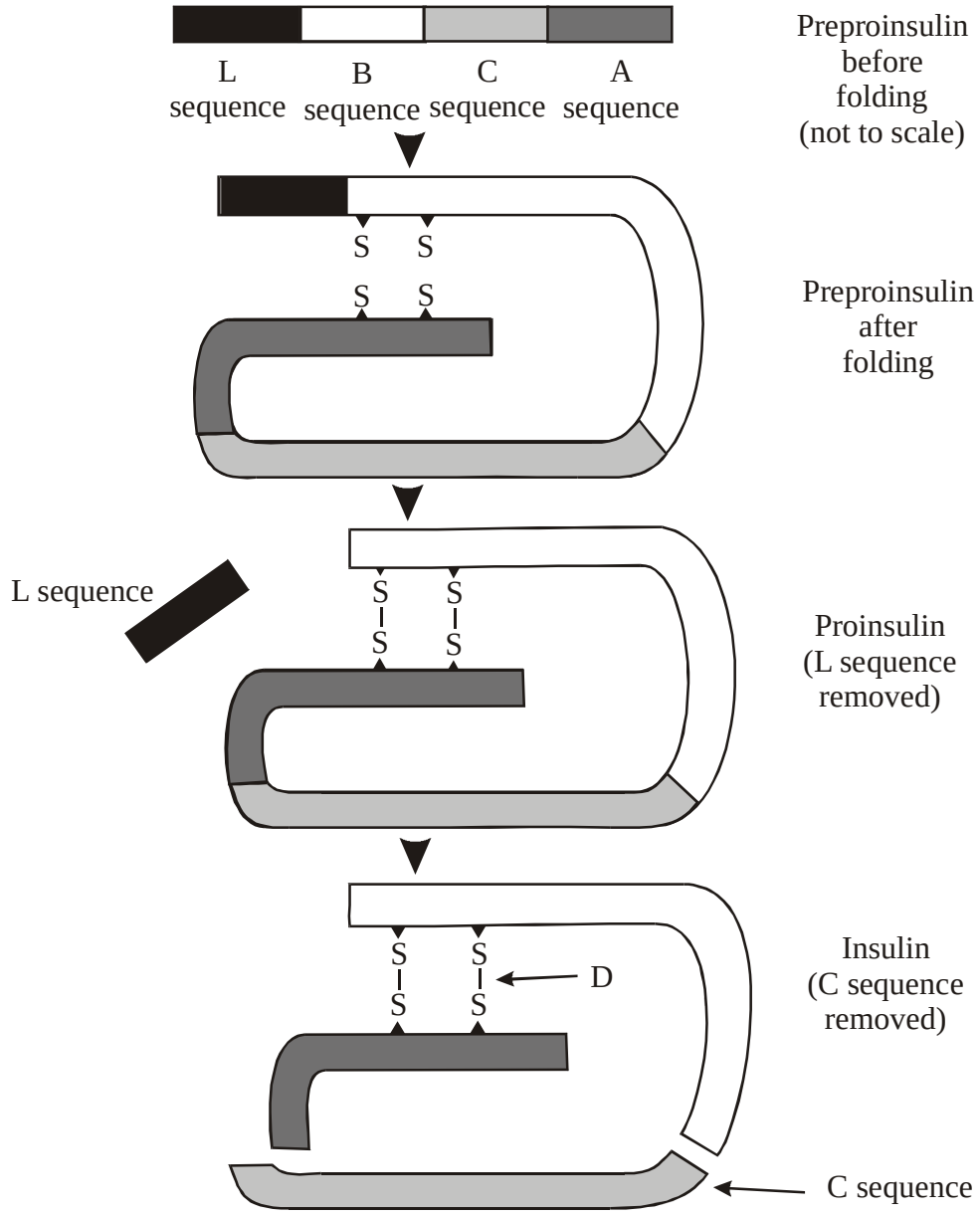


Figure 9

The amino acid sequence labelled L in Figure 9 is lipid soluble and its function is to transport the preproinsulin from the ribosomes across the membrane of the endoplasmic reticulum.

d. i. Why would the sequence labelled L make it easier for preproinsulin to cross the membrane of the endoplasmic reticulum?

_____

_____

_____

(1 mark)

ii. The bond labelled D in Figure 9 is between two cysteine amino acids. What name is given to this bond?

_____ (1 mark)

Once inside the endoplasmic reticulum, the L sequence is removed, leaving a molecule called proinsulin. Proinsulin then leaves the endoplasmic reticulum and moves to another organelle where proinsulin is modified further and becomes insulin. This involves removing the sequence labelled C in Figure 9.

e. i Name the organelle that would modify the structure of proinsulin to insulin.

_____(1 mark)

ii. What type of chemical bond would need to be broken to remove sequence C?

_____(1 mark)

The changes in the original protein from preproinsulin to proinsulin to insulin are necessary if insulin is to fold into its correct three-dimensional shape.

f. Explain why it is essential for a protein to have a correct, three-dimensional shape?

_____

_____

_____

(1 mark)

Cells that can absorb glucose from the bloodstream include skeletal muscle cells and cells of the liver. Figure 10 shows the cell membrane from a skeletal muscle cell and its interaction with a molecule of insulin.

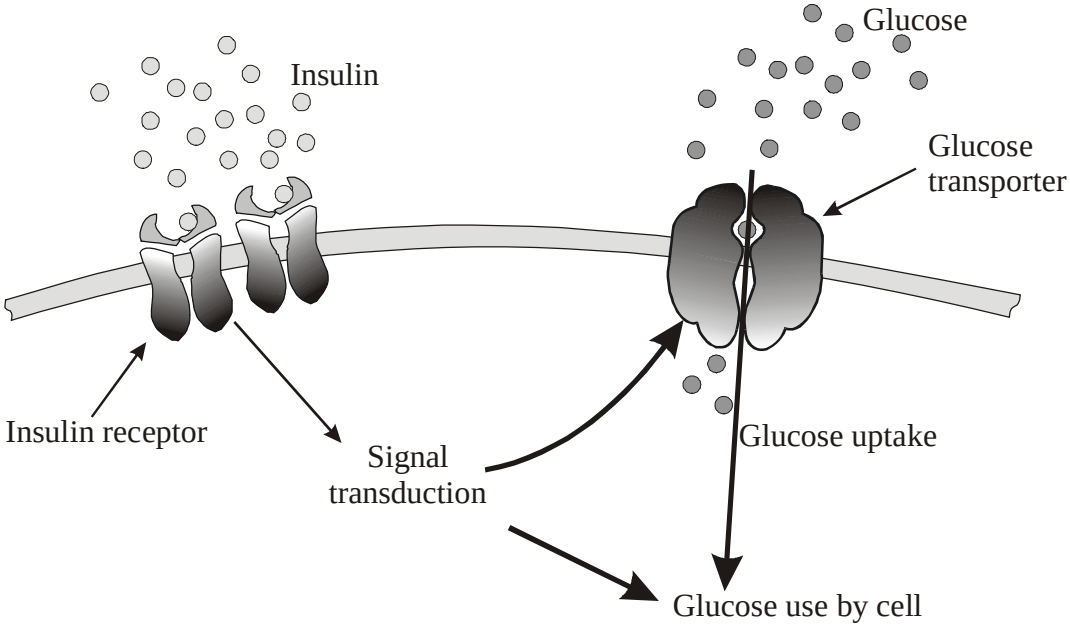


Figure 10

g. What is signal transduction?

_____

_____

_____

(1 mark)

Refer to Figure 10 to answer part h.

h. i. Explain how the signal transduction shown in Figure 10 results in a lowering of blood glucose levels?

_____

_____

_____

_____

_____

(2 marks)

ii. In diabetes mellitus Type 2, blood glucose levels remain high even though sufferers do produce insulin. By referring to Figure 10, describe two different mechanisms that could cause high blood glucose levels in people with Type 2 diabetes.

Mechanism 1_____

_____

Mechanism 2_____

_____

(2 marks)

Total = 13 marks

Question 2

a. Table 3 lists several features of biomacromolecules found in cells. Complete the gaps in the table.

Table 3

Class of biomacromolecule	Location in Cell of biomacromolecule	Function of biomacromolecule	Monomer(s) of biomacromolecule
	Nucleus	Stores Coded Information	
	Cytoplasm	Organic Catalyst used in Glycolysis	
	Cell Wall	Structural Support	
		Selective Barrier	Fatty acids and glycerol

(4 marks)

b. Table 4 shows the two main stages of the process of photosynthesis. Complete the gaps in the table by writing "Produced" or "Consumed" or "Yes" or "No" as indicated.

Table 4

	Is ATP Produced or Consumed?	Is a 6-carbon sugar produced? (Yes or No)
Light Dependent Reactions		
Light Independent (Dark) Reactions		

(2 marks)

c. Starch is sometimes listed as a final product of photosynthesis. How does starch differ from a 6-carbon sugar such as glucose?

_____

_____

_____

(1 mark)

Total = 7 marks

Question 3

Figure 11 shows the structure of a typical virus.

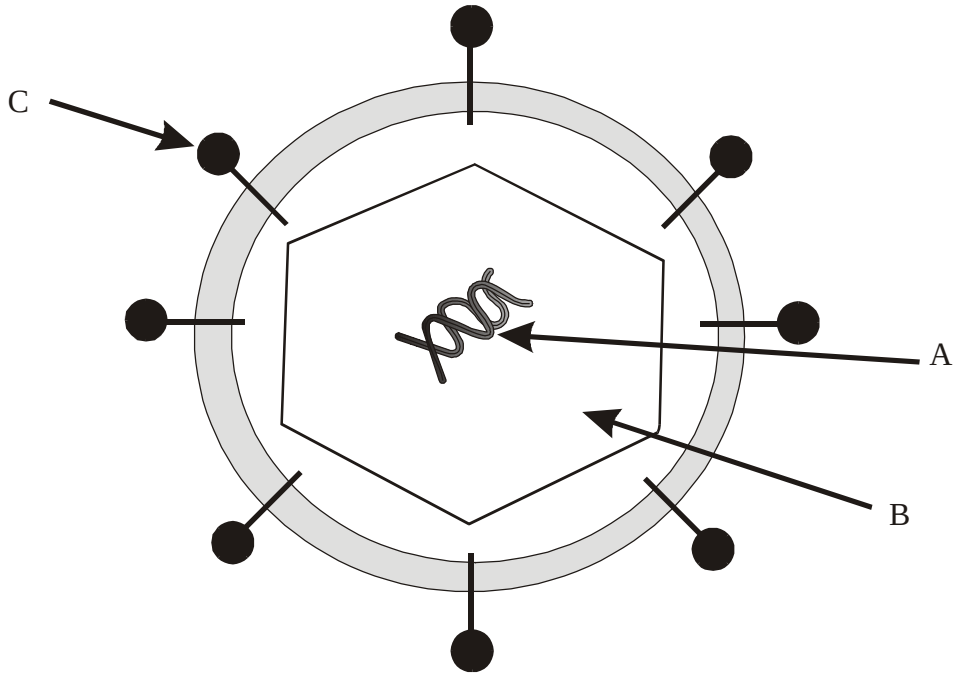


Figure 11

a. Name the biomolecules that make up part:

A. _____ B. _____ (1 mark)

The part labelled C in Figure 11 is made up of a glycoprotein. These molecules are often used as the basis for a vaccine. When injected into the body, glycoproteins predominantly stimulate humoral immunity but are poor at stimulating cell-mediated immunity.

b. i. In the situation described above, what role does the glycoprotein molecule play in the immune response?

_____

(1 mark)

ii. Distinguish between cell-mediated and humoral immunity.

_____

_____

_____

_____

(2 marks)

c. When viruses are grown in the laboratory to make a vaccine, they are usually cultured in chicken eggs. This is a time consuming process. Bacteria, on the other hand, are usually cultured on agar plates. Explain why viruses and bacteria are cultured differently in the laboratory.

_____

_____

_____

_____

_____

(2 marks)

Total = 6 marks

Question 4

In immunology, the latent period is defined as the time lapse between the exposure to an antigen and the production of antibodies. An experiment was done to measure the total antibody production by a child after two exposures to the same antigen. The results are shown in Figure 12.

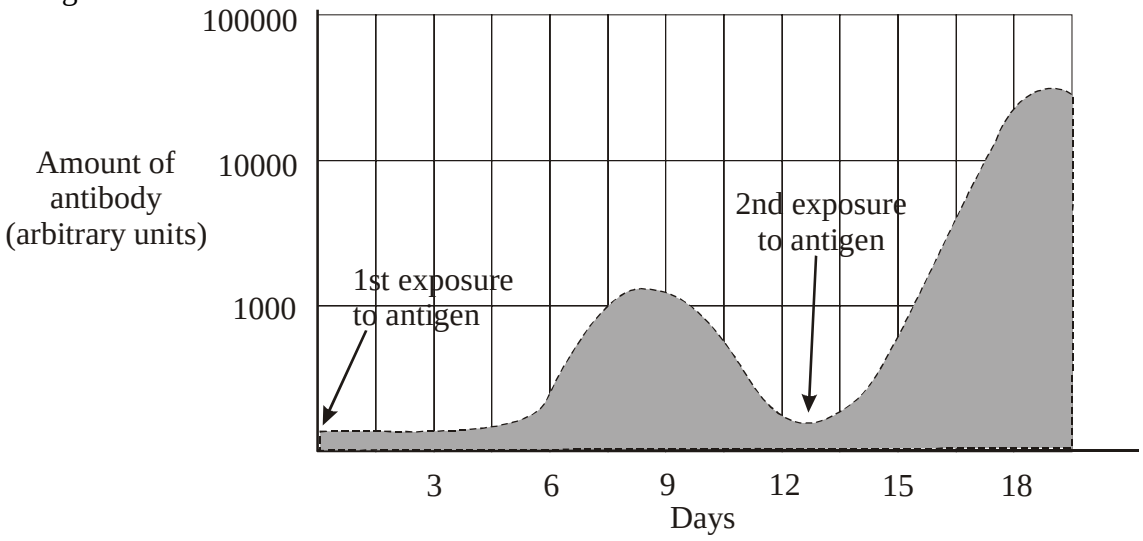


Figure 12

a. State one conclusion that can be made about the latent period from the data shown in Figure 12.

_____

_____

_____

(1 mark)

b. From your own knowledge, provide an explanation for the conclusion that you stated in part a.

_____

_____

_____

(1 mark)

A biologist investigated how the change in pH affected the rate of activity of the enzyme catalase in the following reaction.

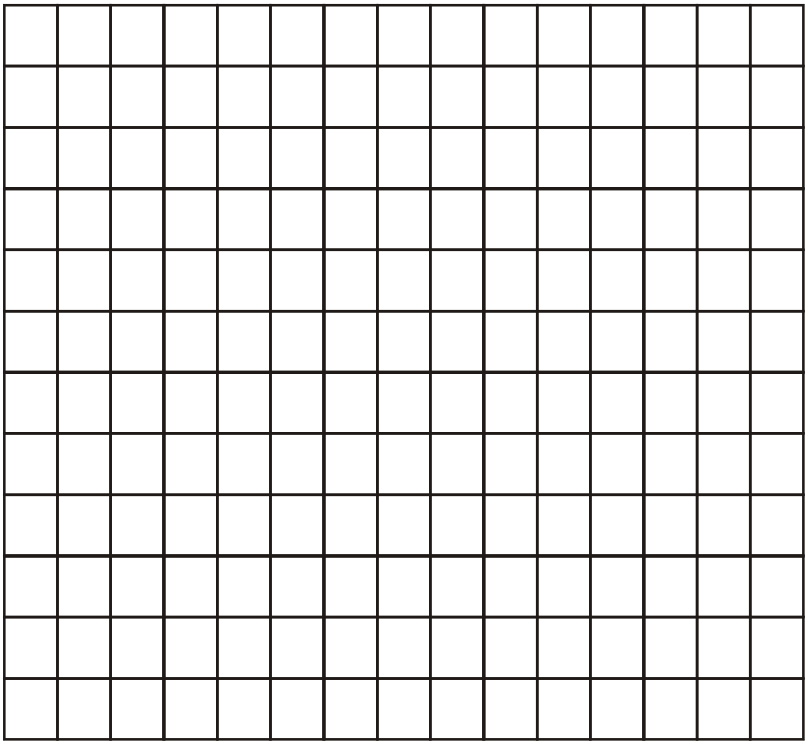
$$H_2O_2 \xrightarrow{\text{Catalase}} H_2O + O_2$$

In this experiment, the amount of oxygen produced was used as a measure of catalase activity. All other factors apart from pH were kept constant in the experiment.
Her results are shown in Table 5.

Table 5

pH	Enzyme Activity
4.0	0.0
4.5	1.0
5.0	2.0
5.5	2.5
6.0	3.5
6.5	4.0
7.0	4.5
7.5	4.0
8.0	3.0
8.5	1.5
9.0	0.5
9.5	0.0

c. Using the data given in Table 5, plot a line graph of the rate of catalase activity versus pH on the graph paper below. Use the horizontal axis for pH. (2 marks)



d. State one conclusion that can be drawn from your graph.

_____

_____

_____

(1 mark)

e. What would you expect to happen to a molecule of catalase as the pH is changed from 7.0 to 9.5?

_____

_____

_____

(1 mark)

f. Catalase is made up of four polypeptide chains. What level of protein structure relates to the number of different polypeptides a protein has?

_____

(1 mark)

Total = 7 marks

Question 5.

Sethoxydim is a selective herbicide that blocks the production of fatty acids by inhibiting a single enzyme involved in their synthesis. Sethoxydim kills grasses but broad-leaved plants, such as vegetable crops, are unharmed.

a. What structural part of a plant cell would be the most affected if it is unable to synthesise fatty acids? Justify your answer.

_____

_____

_____

(1 mark)

b. Fatty acid synthesis occurs in the smooth endoplasmic reticulum. How does smooth endoplasmic reticulum differ from rough endoplasmic reticulum?

_____

_____

_____

(1 mark)

c. Would you expect broad-leaved plants to have the same target site as grasses for Sethoxydim? Justify your answer.

_____

_____

_____

(1 mark)

d. Sethoxydim is usually sprayed on grass foliage and is then transported to new areas of growth, such as buds in the stems and roots. How would you expect Sethoxydim to be transported to these areas of growth?

_____

_____

(1 mark)

e. Sethoxydim is a plant growth regulator. Give the name of another plant growth regulator.

_____

(1 mark)

Total = 5 marks

Question 6

Chagas Disease is caused by the pathogen, *Trypanosoma cruzi*, that is endemic to much of South America. Its life cycle is shown in Figure 13.

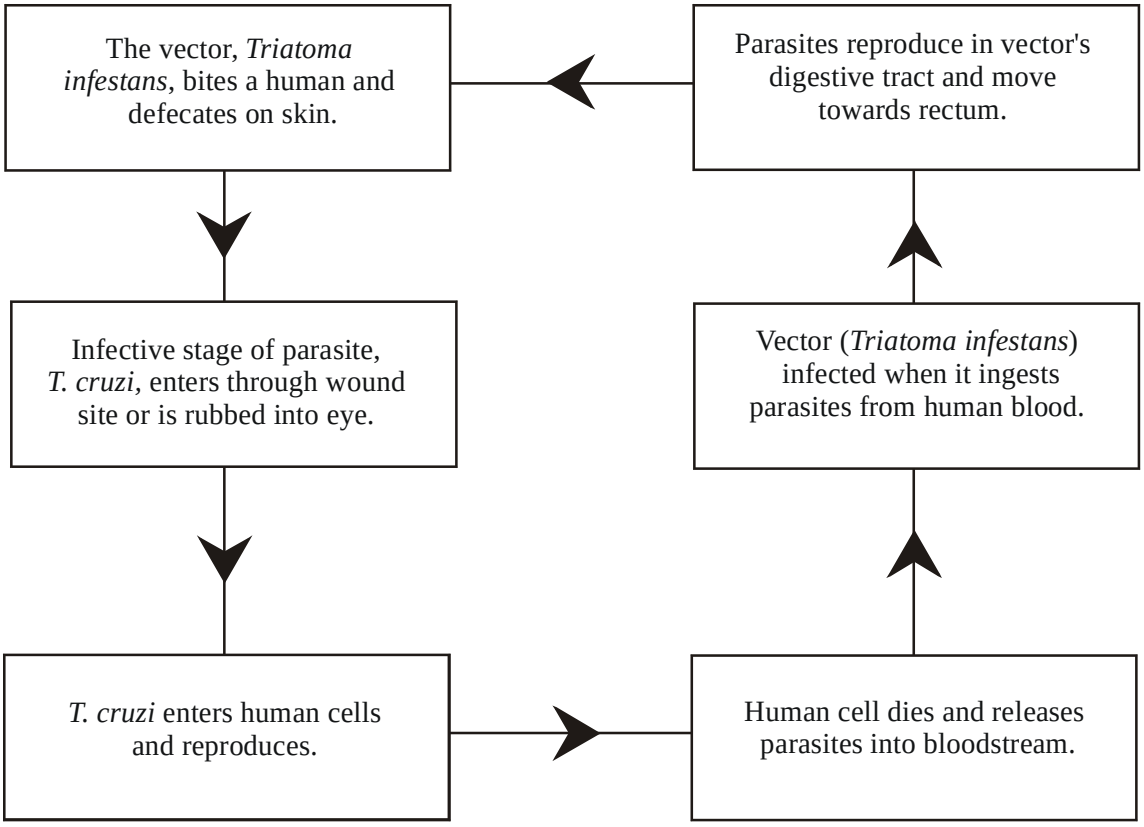


Figure 13

a. Chagas disease kills thousands of people every year. Distinguish between the roles played by the vector and the pathogen.

_____

_____

_____

(1 mark)

The vector for Chagas Disease is a bug, *Triatoma infestans*, that inhabits the cracks in the mud brick homes of many of the poorer local people. It feeds on blood and finds its food source by sensing body heat. When feeding, it stabs its piercing mouthparts into the skin and commences sucking. Feeding may last up to thirty minutes. Its stabbing mouthparts are coated with both an anaesthetic and an anticoagulant. Once feeding is completed, the bug defecates at the feeding site. It also releases pheromones at the feeding site.

b. Explain the importance to the vector of the following:

i. Having its stabbing mouthparts coated with an anticoagulant.

_____

_____

_____

(1 mark)

ii. Having its stabbing mouthparts coated with an anaesthetic.

_____

_____

_____

(1 mark)

iii. Releasing pheromones at the feeding site.

_____

_____

_____

(1 mark)

c. Why is it important to the parasite that the bug defecates after feeding?

_____

_____

_____

(1 mark)

d. Once *T. cruzi* enters its human host, it displays some cell membrane proteins from its host on its own surface. How does this benefit the parasite?

_____

_____

_____

(1 mark)

Scientists have discovered that *T. cruzi* antigens stimulate strong autoimmune responses in its host.

e. Using this information, explain the likelihood of developing an effective vaccine for Chagas Disease.

_____

_____

_____

_____

_____

(2 marks)

Total = 8 marks

Question 7.

a. Photosynthesis and aerobic respiration are two key processes that occur in cells. In the boxes below, write a balanced chemical equation for each of these processes.

Photosynthesis

Aerobic Respiration

(2 marks)

b. i. Is photosynthesis a catabolic or anabolic reaction? Justify your answer.

_____

_____

_____

(1 mark)

ii. Is aerobic respiration a catabolic or anabolic reaction? Justify your answer.

_____

_____

_____

(1 mark)

Total = 4 marks

End of Task

Suggested Answers VCE Biology Year 12 Trial Exam Unit 3

Multiple Choice

1.C	2.B	3.D	4.D	5.C	6.D	7.A	8.B	9.C	10.A	11.D
12.D	13.C	14.B	15.B	16.D	17.B	18.C	19.A	20.D	21.C	22.A
23.D	24.A	25.D								

Short Answer

Question 1

a. Endocrine system (1).

b. A hormone is a substance produced by certain cells in the body that brings about an effect in specific target cells in other parts of the body (1).

c. Different mammals would produce insulin that differed in the specific sequence of amino acids (1).

d. i. Since membranes are composed largely of lipids, the sequence labelled L would cross membranes easily because it is lipid soluble (1).
ii Disulphide bond (1).

e. i. Golgi apparatus (1).
ii. Peptide bond (1).

f. A protein must fold into its correct three-dimensional shape so that its active site is accurately formed (1).

g. Signal transduction is series of chemical changes that are initiated when a signal molecule interacts with a receptor resulting in a change of functioning in the cell (1).

h. i The insulin molecule acts as a signal that is detected by insulin receptors on the cell membrane (1). This signal transduction then stimulates glucose transporters on the cell membrane that allow glucose to move into the cell, causing blood glucose levels to fall (1).
ii. Any two of the following (2).

- The insulin receptors may not recognise insulin (or vice versa).
- The signal transduction to the glucose transporters may not stimulate them to allow glucose uptake into the cell.
- Any other reasonable suggestion based on Figure 10.

Question 2

a.

Nucleic Acid (½)	Nucleus	Stores Coded Information	Nucleotide (½)
Protein (½)	Cytoplasm	Organic Catalyst used in Glycolysis	Amino Acid (½)
Polysaccharide (½)	Cell Wall	Structural Support	Glucose (½)
Lipid or Phospholipid (½)	Cell Membrane or Membrane (½)	Selective Barrier	Fatty acids and glycerol

b.

	Is ATP Produced or Consumed?	Is a 6-carbon sugar produced? (Yes or No)
Light Dependent Reactions	Produced (½)	No (½)
Light Independent (Dark) Reactions	Consumed (½)	Yes (½)

c. Starch is a polysaccharide (polymer) composed of large numbers of 6-carbon sugars, such as glucose which is its monomer (1).

Question 3

a. A – Nucleic acid, B – Protein (1).

b. i. The glycoprotein acts as an antigen (1).

ii. Cell-mediated immunity refers to the direct action of immune cells (such as Cytotoxic T cells) against a pathogen (1). Humoral immunity refers to the direct action of antibodies (rather than the cells B cells that produce them) against pathogens in the body (1).

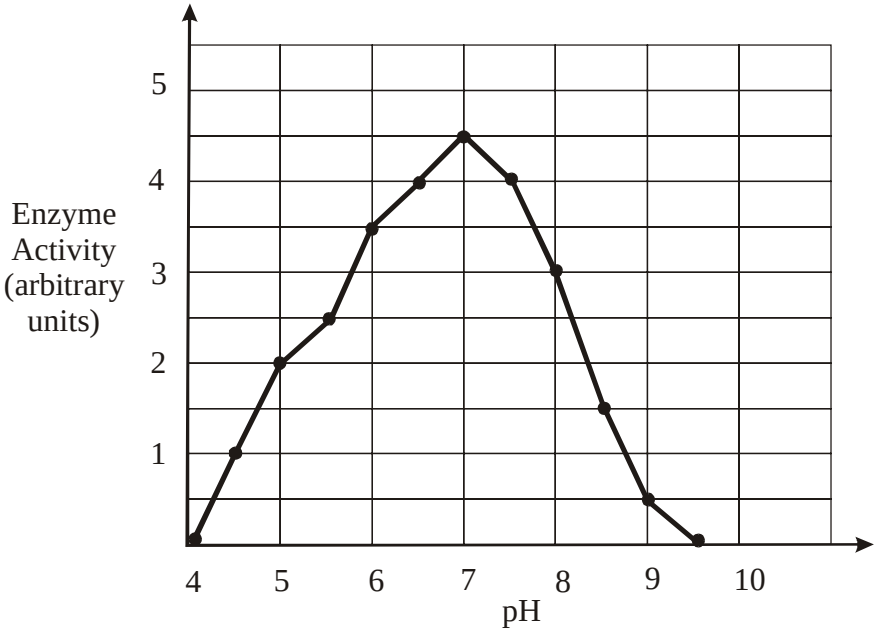
c. Viruses can only replicate inside living cells and therefore need to be cultivated in an appropriate source material, such as chicken eggs (1). Bacteria, however, can be grown in the absence of other cells providing their nutritional requirements are met on an agar plate (1).

Question 4

a. The latent period is much shorter after the second exposure to the same antigen (1).

b. The latent period is shorter after the second exposure to the antigen because of the presence of memory cells (1).

c.



One mark given for correct labelling of axes (1).
One mark given for correct plotting of points (1).

d. Any one of the following (1).
- The optimum pH for the activity of catalase is 7.0.
- Any other reasonable suggestion based on the data from Table 5.

e. Any one of the following (1).
- The active site of catalase would be altered.
- Catalase would be denatured.
- The tertiary structure of catalase would be altered.

f. Quaternary structure (1).

Question 5

a. Membranes of the plant cell would be most affected since these are made up of large amounts of fatty acids (1).

b. Smooth endoplasmic reticulum does not have ribosomes attached whereas rough endoplasmic reticulum does (1).

c. The target site of broad-leaved plants would be different from grasses since Sethoxydim does not kill broad-leaved plants (1).

d. The phloem would transport Sethoxydim (1).

e. Any one of the following (1).
- IAA (extracted from plants).
- Growth retardants.
- Other herbicides e.g. Roundup.
- Ethylene.
- Any other plant growth regulator.

Question 6

a. The pathogen is the organism that invades the host and causes disease while the vector transports the pathogen between hosts (1).

b. i. The anticoagulant prevents the blood from clotting while the vector is feeding (1).
ii. The anaesthetic prevents the host from sensing pain while being bitten. This ensures that the vector is not disturbed while it is feeding (1).
iii Releasing pheromones at the feeding site helps the vector to locate its food source when it needs to feed again (1).

c. When the bug defecates after feeding, it deposits large numbers of the parasite near the wound where they can enter the host's tissues (1).

d. By displaying cell membrane proteins from the host on its surface, the parasite is less likely to be attacked by the immune system of its host (1).

e. Since the antigens of *T. cruzi* stimulate a strong autoimmune response, it is not likely that an effective vaccine will be developed (1). This would be expected since the use of antigens from this pathogen to develop a vaccine would also cause the host's immune system to attack its own tissues (1).

Question 7

a. **Photosynthesis Equation** (1).

$$6H_2O + 6CO_2 \xrightarrow{\text{Chlorophyl, light, enzymes}} C_6H_{12}O_6 + 6O_2$$

OR

$$12H_2O + 6CO_2 \xrightarrow{\text{Chlorophyll, light, enzymes}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

Aerobic Respiration (1).

$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Enzymes}} 6H_2O + 6CO_2 + \begin{matrix}\text{Energy to form} \\ 36\text{ - }38\text{ ATP}\end{matrix}$$

b. i. Photosynthesis is an anabolic reaction since it builds up complex molecules from simpler ones (1).

ii. Aerobic respiration is a catabolic reaction since it breaks down complex molecules into simpler ones (1).