



VCE BIOLOGY 2013

YEAR 12 **PRACTICE** EXAM UNIT 3

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Time allowed: 150 minutes

Total marks: 116

42 Multiple Choice Questions

9 Short Answer Questions

An Answer Sheet is provided for Section A.

Answer all questions in Section B in the space provided.

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Student Name.....

VCE Biology 2013 Year 12 Trial Exam Unit 3

There are 42 **Multiple Choice Questions** to be answered by circling the correct letter in the table below. Use only a 2B pencil. If you make a mistake, erase it and enter the correct answer. Marks will not be deducted for incorrect answers.

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	Question 26	A	B	C	D
Question 27	A	B	C	D	Question 28	A	B	C	D
Question 29	A	B	C	D	Question 30	A	B	C	D
Question 31	A	B	C	D	Question 32	A	B	C	D
Question 33	A	B	C	D	Question 34	A	B	C	D
Question 35	A	B	C	D	Question 36	A	B	C	D
Question 37	A	B	C	D	Question 38	A	B	C	D
Question 39	A	B	C	D	Question 40	A	B	C	D
Question 41	A	B	C	D	Question 42	A	B	C	D

VCE Biology 2013 Year 12 Practice Exam Unit 3

SECTION A – Multiple Choice Questions

Question 1

A single polypeptide molecule that makes up a protein consists of the following structure(s):

- A. primary.
- B. primary and secondary.
- C. primary, secondary and tertiary.
- D. primary, secondary, tertiary and quaternary.

Question 2

Which one of the following would be regarded as an example of an anabolic reaction? The formation of

- A. carbon dioxide and water during respiration.
- B. fatty acids and glycerol after the digestion of lipids.
- C. glucose during photosynthesis.
- D. amino acids after the synthesis of proteins.

Question 3

Which of the following would be regarded as a monomer? All

- A. enzyme molecules.
- B. carbohydrate molecules.
- C. glucose molecules.
- D. sugar molecules.

Question 4

Lysosomes are organelles that are responsible for the

- A. removal of waste products that accumulate during photosynthesis.
- B. process of endocytosis to occur when foreign micro-organisms enter the cell.
- C. digestion of material that is found in food vacuoles by enzymes.
- D. synthesis and repair of cell structures, such as the cell membrane, when they no longer perform their usual function.

Question 5

Which one of the following statements best describes the structure and function of the cell membrane? Cell membranes are

- A. made up mainly of phospholipid receptors which enable the immune system to detect foreign antigens.
- B. a phospholipid bilayer in which are embedded protein channels, and this structure enables the membrane to control what enters and leaves the cell.
- C. always surrounded by a carbohydrate layer so that the cell has a firm structure and doesn't dry out.
- D. composed of a protein bilayer, throughout which is a phospholipid channel for water soluble molecules to pass through.

Question 6

Which one of the following organelles, found in both plant and animal cells, is not a membrane bound organelle?

- A. Vacuole.
- B. Ribosome.
- C. Endoplasmic reticulum.
- D. Golgi body.

Question 7

Which element is not found in carbohydrates?

- A. Carbon.
- B. Nitrogen.
- C. Hydrogen.
- D. Oxygen.

Question 8

A phospholipid molecule can be represented as



Which diagram most closely resembles the phospholipid arrangement in a plasma membrane?

- A.
- B.
- C.
- D.

Question 9

Figure 1 below shows three ways that molecules can cross a plasma membrane.

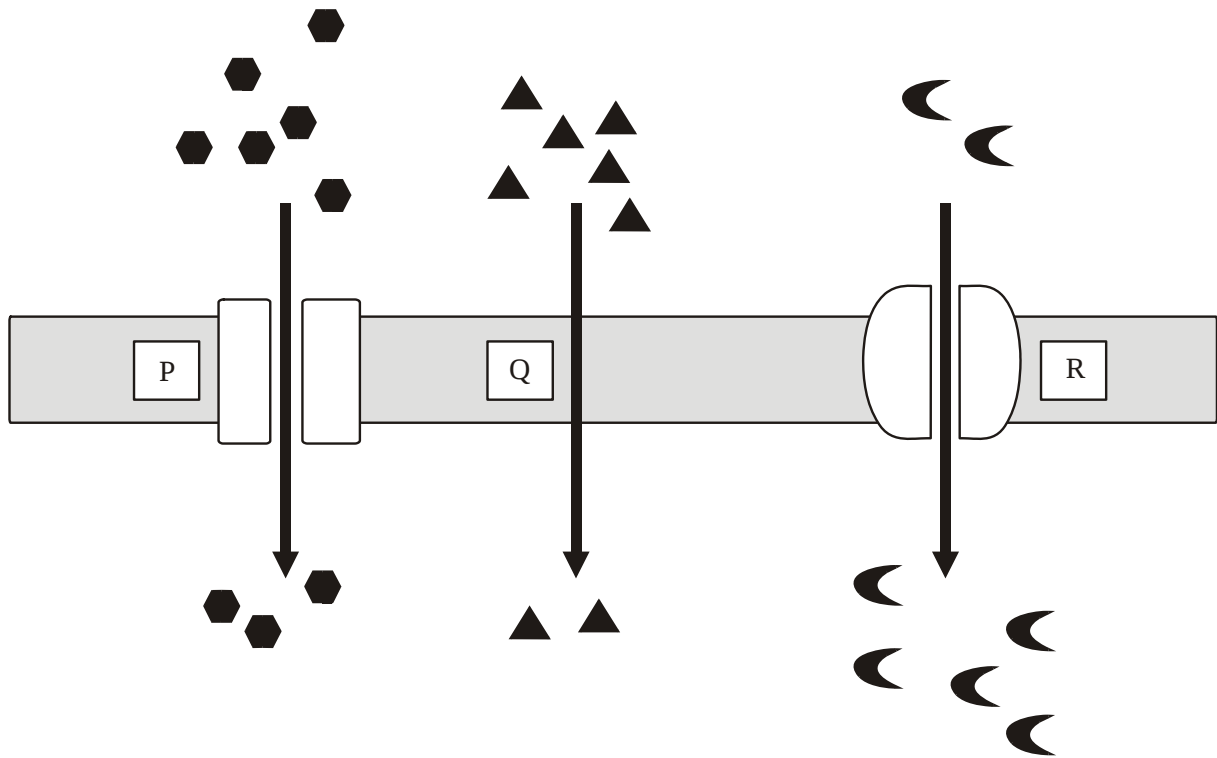


Figure 1

The three types of movement are

	P	Q	R
A.	active transport	diffusion	facilitated diffusion
B.	diffusion	active transport	facilitated diffusion
C.	diffusion	facilitated diffusion	active transport
D.	facilitated diffusion	diffusion	active transport

Question 10

Which of the following is not a function of proteins?

- A. Signal transduction.
- B. Transport across membranes.
- C. The movement of water during osmosis.
- D. Acting as enzymes.

Use the following information to answer Questions 11 and 12.

Figure 2 below is a graph representing the relationship between increasing substrate concentration and the increasing rate of reaction for a biochemical activity in humans.

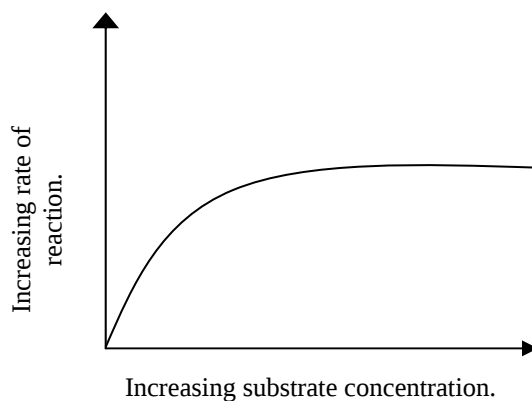


Figure 2

Question 11

From your own knowledge and the information provided in **Figure 2**, one can conclude that the rate of reaction increases initially and then remains constant because

- A. there have been changes in the active site of the enzyme.
- B. all the products of the biochemical activity have been used.
- C. the pH at which the enzyme operates changed, making it unable to form a peptide bond.
- D. the concentration of the enzyme in this biochemical reaction remains constant during this biochemical activity.

Question 12

The optimum temperature at which this enzyme is most likely to operate is

- A. normal room temperature.
- B. normal human core body temperature.
- C. dependent on the type of biochemical activity.
- D. unable to be determined from the information provided.

Question 13

Figure 3 below is a flow chart illustrating how core body temperature is regulated in homeotherms when there is an increase in core body temperature.

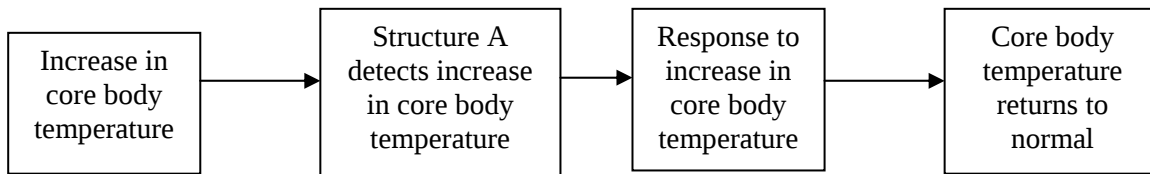


Figure 3

From the information in **Figure 3** and your own knowledge, one could conclude that the response to an increase in core body temperature would be an increase in

- A. the metabolic rate and an increase in sweating.
- B. shivering and vasoconstriction.
- C. the metabolic rate and an increase in shivering.
- D. sweating and vasodilation.

Question 14

Which one of the following statements enables us to distinguish between how the nervous and endocrine systems function?

- A. The nervous system tends to bring about their responses slowly to stimuli, while the endocrine system response time is much faster.
- B. The endocrine system's response lasts a relatively short time, while the nervous system's response is longer lasting.
- C. In both the nervous and endocrine systems, the responses to stimuli and the length of time the responses last are similar.
- D. The response time to stimuli is quicker, and the length of time a response lasts is less, in the nervous system than the endocrine system.

Question 15

Which one of the following combinations should be included in a properly designed experiment?

- A. Single variable and controls.
- B. Multiple variables and large sample.
- C. Multiple variables and controls.
- D. Single variable and small sample.

Use the following information to answer Questions 16 and 17.

Figure 4 below is a table showing the results obtained by four students who were investigating the concentration of oxygen and carbon dioxide in test tubes that contained the same freshwater plants under different light conditions.

Student	O ₂ levels during daylight	O ₂ levels during night time	CO ₂ levels during daylight	CO ₂ levels during night time
W	HIGH	LOW	LOW	HIGH
X	LOW	HIGH	LOW	HIGH
Y	LOW	HIGH	HIGH	LOW
Z	HIGH	LOW	HIGH	LOW

Figure 4

Question 16

From the information shown in **Figure 4** and your own knowledge, which student obtained the correct results when doing the investigation on the freshwater plants? Student

- A. W
- B. X
- C. Y
- D. Z

Question 17

Which one of the following statements would be the correct explanation for the processes that are involved in the investigation of freshwater plants in **Figure 4**? During daylight hours oxygen is

- A. produced in the stroma of chloroplasts and respiration provides for the freshwater plant's energy needs.
- B. made from water molecules and some of this oxygen may be used by the plant during respiration.
- C. produced by chlorophyll molecules as a result of the Calvin cycle and respiration is not required.
- D. made in the grana of chloroplasts from carbon dioxide molecules and respiration is needed for the plants to function at their optimal rate.

Question 18

Which one of the following molecules is required for anaerobic respiration to proceed normally?

- A. Pyruvate.
- B. Carbon dioxide.
- C. FAD.
- D. Acetyl CoA.

Question 19

Which one of the following is the correct sequence of structures that a protein molecule, on being released from a cell, moves along and through when it is made in a cell?

- A. Ribosome, endoplasmic reticulum, golgi body, vesicle and cell membrane.
- B. Vesicle, endoplasmic reticulum, golgi body, ribosome and cell membrane.
- C. Endoplasmic reticulum, golgi body, ribosome, vesicle and cell membrane.
- D. Golgi body, endoplasmic reticulum, ribosome, vesicle and cell membrane.

Question 20

In order to treat people who have been bitten by venomous snakes, antivenoms have been developed by scientists injecting low doses of snake venom into horses. After some time, small volumes of blood are collected from the horses and the antivenom made. Which one of the following is the best explanation as to why antivenoms are given to snake bite victims?

The antivenom contains the

- A. B and T cells which are needed for the production of antibodies against the snake venom.
- B. antibodies which will specifically bind with the antigens from the snake venom.
- C. antigens from the snake venom which will bring about the necessary specific immune response.
- D. antigens as well as antibodies so that the snake venom antigens can be completely neutralised.

Use the following information to answer Questions 21 and 22.

Figure 5 below is a graph representing the relationship between increasing carbon dioxide concentration and the increasing rate of photosynthesis in a particular plant.

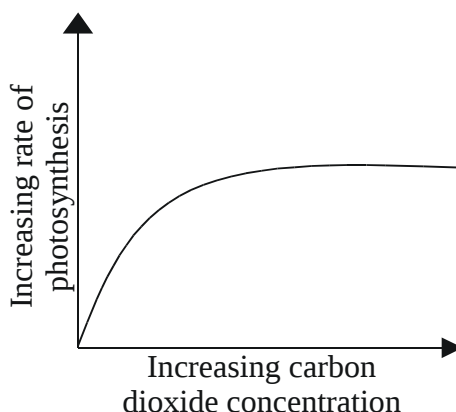


Figure 5

Question 21

From your own knowledge and the information provided in **Figure 5**, one can conclude that the rate of photosynthesis increases initially and then remains constant because

- A. there is not enough carbon dioxide present for the photosynthetic rate to keep on increasing.
- B. carbon dioxide levels have become a limiting factor in the rate of photosynthesis.
- C. this particular plant can only increase its rate of photosynthesis up to a certain level of carbon dioxide concentration.
- D. the concentration of carbon dioxide and the rate of photosynthesis are not dependent on each other.

Question 22

Which one of the following statements about photosynthesis is correct? Photosynthesis

- A. results in the transformation of light energy into chemical energy.
- B. does not need to have enzymes present to speed up the process because it is driven by the release of energy from glucose.
- C. is dependent on the presence of oxygen since it is an anabolic reaction.
- D. uses green wavelengths of light because the pigment chlorophyll, in chloroplasts, is green.

Question 23

Figure 6 below is a diagrammatic representation of a nucleotide with 3 sub-units **A**, **B** and **C**.

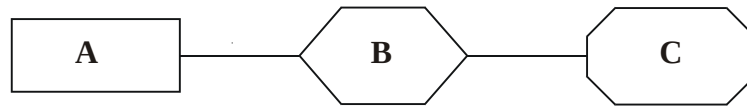


Figure 6

If **A** represents a phosphate group, **B** represents a sugar molecule and **C** represents thymine, which one of the following diagrams shows the correct arrangement of the components in a nucleotide that will pair with thymine.

- A.
- B.
- C.
- D.

Question 24

Oxygen is needed during aerobic respiration because

- A. ATP cannot be synthesized in a cell without the presence of oxygen.
B. enzymes in the cytoplasm will not function if there is no oxygen.
C. oxygen is needed to combine with the final product of the electron transport chain.
D. oxygen is needed for the pyruvate to move from the cytoplasm to the mitochondria.

Question 25

Both the endocrine and nervous systems use negative feedback in some of their control mechanisms. Which one of the following statements could be used to describe a negative feedback system? A

- A. stimulus that results in both the nervous and endocrine systems increasing their activity.
B. response to a particular stimulus results in the stimulus generating a response in the nervous system but not the endocrine system.
C. stimulus results in the response initially increasing and then either increasing further or decreasing, depending on the strength of the stimulus.
D. response to a particular stimulus that results in the stimulus decreasing over time.

Question 26

Which one of the following could explain why cells contain many different enzymes?

Enzymes are

- A. sensitive to different concentrations of the same substrate.
- B. temperature specific in mammals.
- C. only able to function in a narrow pH range.
- D. specific for particular biochemical reactions.

Question 27

The synthesis of ATP from ADP and inorganic phosphate results

- A. from an input of energy when glucose is being synthesised.
- B. in an output of energy as glucose is being broken down.
- C. from an input of energy as glucose is being broken down.
- D. in an output of energy when glucose is being synthesised.

Question 28

Which one of the following statements best describes why a vaccination against small pox can be effective? A vaccination against small pox causes an

- A. inflammation response resulting in the production of antibodies that engulf the small pox virus.
- B. immune response resulting in the production of phagocytes that bind to any small pox viral particles that are present.
- C. immune response that results in the production of memory B-cells that can provide a rapid response if an individual is again infected with small pox.
- D. inflammatory response resulting in the production of memory T-cells that will engulf any small pox viral particles present.

Question 29

Which one of the following statements could be applied to an action potential?

- A. The membrane is initially depolarised with the result that potassium ions move inside the neurone.
- B. A threshold potential has to be reached before an action potential can be generated.
- C. The refractory period is the time that it takes the action potential to reach its target neurone.
- D. During an action potential, the inside of a neurone remains neutral due to the positive and negative charges moving along the neurone.

Question 30

Which one of the following biological terms could be used to describe the engulfing and destruction of pathogenic organisms like bacteria?

- A. Vaccination.
- B. Inflammatory response.
- C. Agglutination.
- D. Phagocytosis.

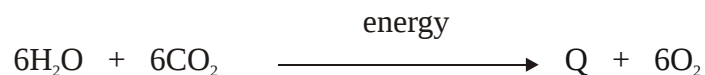
Question 31

The organelle involved in the synthesis of phospholipids is the

- A. endoplasmic reticulum.
- B. vesicle.
- C. mitochondrion.
- D. vacuole.

Question 32

Equation 1 below is a summary of a process that occurs in some living organisms.

**Equation 1**

The product Q in this reaction is

- A. new water.
- B. a monosaccharide.
- C. chlorophyll.
- D. an amino acid.

Question 33

In respiration, the electron transport chain

- A. occurs on the outer membrane of the mitochondria.
- B. has oxygen as an input.
- C. occurs before the Krebs Cycle.
- D. produces 2 ATP molecules.

Question 34

Cellular respiration occurs

- A. during the day and night.
- B. only during the day.
- C. only during the night.
- D. only when photosynthesis is not occurring.

Question 35

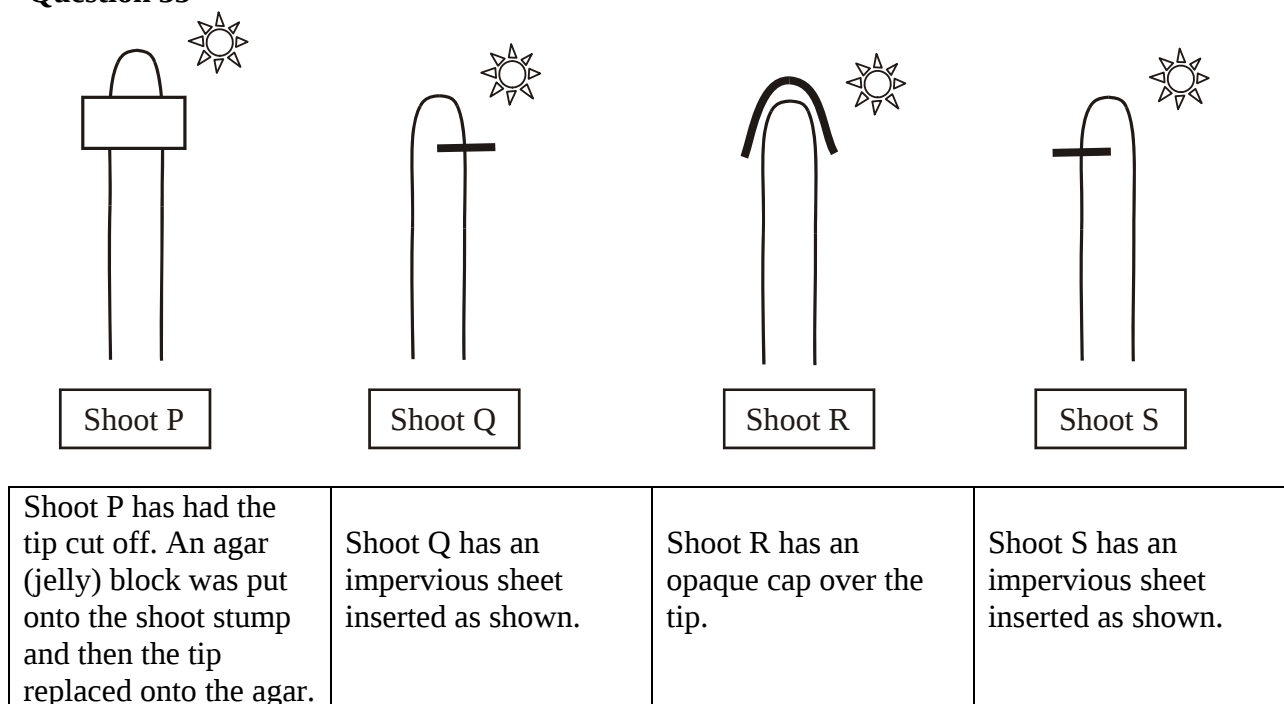


Figure 7

With reference to **Figure 7** above, all the shoots are illuminated from the right. Which shoots will bend to the right, towards the light?

- A. Shoot P and Shoot Q only.
- B. Shoot S only.
- C. Shoot Q only.
- D. None of the shoots.

Question 36

Malaria kills approximately 3 million people each year. The protozoan *Plasmodium vivax* has a complex lifecycle, spending some of its lifecycle in humans and part of its lifecycle in female mosquitoes. A human may catch malaria when bitten by an infected female mosquito. The pathogen for the disease is

- A. *Plasmodium vivax*.
- B. malaria.
- C. mosquitoes.
- D. humans.

Question 37

Which of the following do not kill bacteria?

- A. Antibiotics.
- B. Bacteriophages.
- C. Antiseptics.
- D. Cytotoxic T (T_C) cells.

Question 38

B and T cells are an important part of the immune response. Which statement is correct?

- A. B cells mature in the thymus gland.
- B. B cells can become plasma cells and release antibodies.
- C. T cells release antibodies to signal B cells to respond.
- D. Helper T cells can directly kill foreign or infected cells.

Question 39

Figure 8 below is a diagram of an antibody.

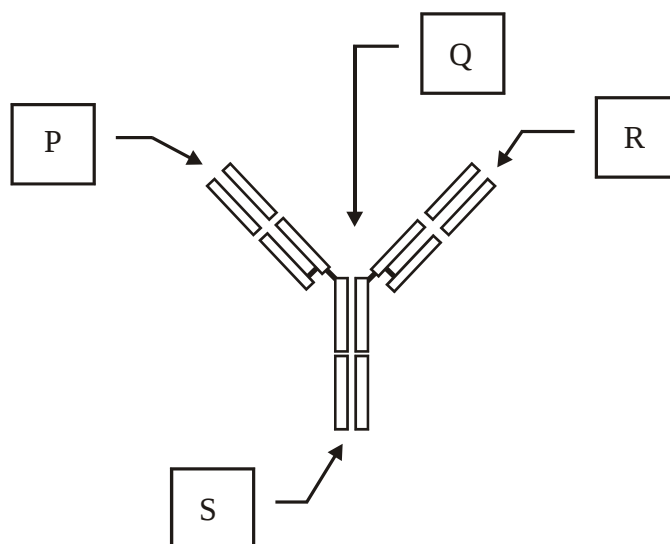


Figure 8

The antigen binding sites are

- A. Q.
- B. S.
- C. P and R.
- D. P, R and S.

Question 40

Hayfever is an allergic response. Which statement is correct?

- A. During the allergic response, mast cells secrete excess mucus.
- B. Antibodies called immunoglobulin E (IgE) are involved.
- C. Drugs called antihistamines stop the pollen from entering.
- D. Hayfever occurs mainly in winter, when people catch colds.

Question 41

Autoimmune diseases are caused by the body mistakenly attacking its own cells. Which of the following has **incorrect** information concerning autoimmune diseases?

	Disease	Attacked cells
A.	Diabetes	Beta cells in pancreas
B.	Multiple sclerosis	Myelin sheath of axons
C.	Rheumatoid arthritis	Cartilage of joints
D.	Sickle cell anaemia	Red blood cells

Question 42

One of the drugs used to treat AIDS patients inhibits reverse transcriptase. This drug

- A. stops the synthesis of DNA from the viral RNA.
- B. stops the synthesis of the AIDS toxin.
- C. reverses the synthesis of mRNA.
- D. blocks T cell receptors.

End of Section A

VCE Biology 2013 Year 12 Practice Exam Unit 3

SECTION B – Short Answer Questions

Question 1

Pepsin is an enzyme which reacts with food proteins in the stomach to produce peptides. The stomach has a pH of 2.

- a. The names of enzymes usually have the same ending. What is the ending?

_____ (1 mark)

- b. To what chemical group do all enzymes belong?

_____ (1 mark)

- c. Pepsin reacts with proteins. What is the general name given to chemicals with which enzymes react?

_____ (1 mark)

- d. In a reaction between pepsin molecules and food protein molecules, which will be used up first? Explain.

_____ (2 marks)

- e. What role does the tertiary structure of pepsin have in the reaction?

_____ (2 marks)

- f. Sketch a graph on the axes in **Figure 9** below to show activity of pepsin against pH.



Figure 9

(1 mark)

- g. On the graph in **Figure 9** above indicate the optimal pH.

(1 mark)

Total = 9 marks

Question 2

While the endocrine and nervous systems appear to be different, they both rely on signalling molecules for information to be transmitted within each system. **Figure 10** is an example of a model which shows how a signal molecule could transfer its information into a cell.

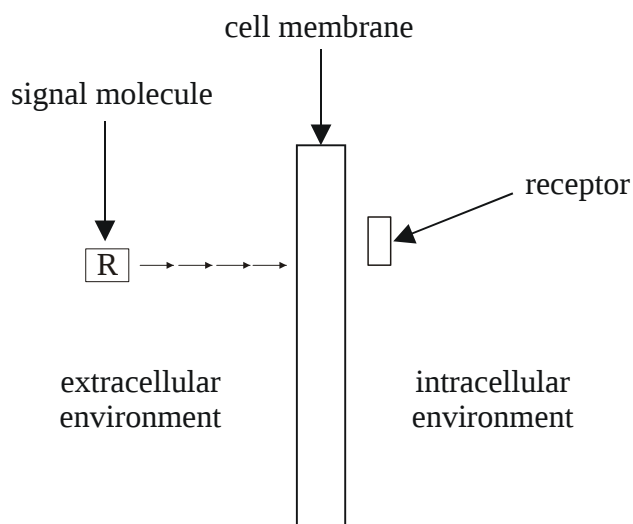


Figure 10

- a. What general term is used for signalling molecules in the nervous and endocrine systems respectively?

(1 mark)

Signalling molecules in the endocrine system are made from either fatty acids or amino acids.

- b. Briefly explain from the information provided in **Figure 10** whether the signal molecule **R** is made from fatty acids or amino acids.

(2 marks)

- c. Briefly explain what happens at a synapse in the nervous system.

(2 marks)

- d. What biological term is used when a neurone is sufficiently depolarised to cause an electrical impulse to travel along its length?

(1 mark)

Total = 6 marks

Question 3

DNA and RNA are nucleic acids that are involved in protein synthesis. A small section of messenger RNA has the following sequence of bases:

UACGAACUGUGCGCA

- a. Which base is found in DNA but not RNA?

(1 mark)

- b. Explain two ways in which RNA and DNA differ, apart from their base difference.

(2 marks)

- c. What is the maximum number of amino acids that this small section of messenger RNA above could code for?

(1 mark)

Apart from messenger RNA, there is also transfer RNA and ribosomal RNA.

- d. How do the roles of transfer RNA and ribosomal RNA differ?

(2 marks)

- e. Where is ribosomal RNA synthesized within the cell?

(1 mark)

A length of DNA that codes for a polypeptide contains 369 base pairs.

- f. How many codons are associated with this piece of DNA and what is the maximum number of amino acids that could be present in the polypeptide?

(1 mark)

Total = 8 marks

Question 4

ATP is an important organic molecule and is necessary for the normal functioning of cells, like supplying the energy needed for intracellular transport.

- a. Name the structure that is responsible for the transport of proteins from ribosomes to golgi bodies.

_____ (1 mark)

ATP synthase is an enzyme that speeds up the synthesis of ATP within cells.

- b. Identify the substrate/s for the reaction that ATP synthase speeds up.

_____ (1 mark)

- c. Name and briefly explain which organelle is likely to be found in large numbers near parts of the cell membrane that are involved in active transport.

_____ (2 marks)

- d. Name the process that produces 2 ATP molecules whether oxygen is present or not.

_____ (1 mark)

- e. Briefly explain which metabolic pathway releases the most energy in the form of ATP molecules during cellular respiration.

_____ (2 marks)

- f. What advantage does an animal cell gain by converting pyruvate to lactic acid? Explain.
-
-
-
-
- (1 mark)**
- g. Briefly explain why ATP molecules are made from the substrate/s in **Question 4b** and not as completely new ATP molecules without the substrate/s.
-
-
-
-
- (1 mark)**
- h. Why is glucose broken down in a series of chemical reactions and not in a single step? Explain.
-
-
-
-
- (1 mark)**
- i. Of what advantage are the cristae of mitochondria to a cell when aerobic respiration takes place?
-
-
-
-
- (1 mark)**

Total = 11 marks

Question 5

Year 12 students prepared three fully sealed pieces of dialysis tubing, **X**, **Y** and **Z**, with each piece containing the same volume, but differing concentrations of glucose solution. All three pieces of dialysis tubing were then put into a large beaker that contained an 8% glucose solution. After one hour the students noticed that the volume in **X** had decreased, the volume in **Z** had increased and the volume in **Y** had stayed the same.

- a. Name the process that resulted in the volume changing in **X** and **Z**.

(1 mark)

- b. Explain your answer to **Question 5a**.

(2 marks)

- c. Is energy needed for the process in **Question 5a**? Explain.

(1 mark)

- d. Which dialysis tubing had the highest concentration of glucose solution?

(1 mark)

- e. Briefly explain why the solution in dialysis tubing **Y** did not change in volume.

(1 mark)

- f. What biological term is used to describe a plant cell so full of water that no more water can enter that cell?

(1 mark)

Total = 7 marks

Question 6

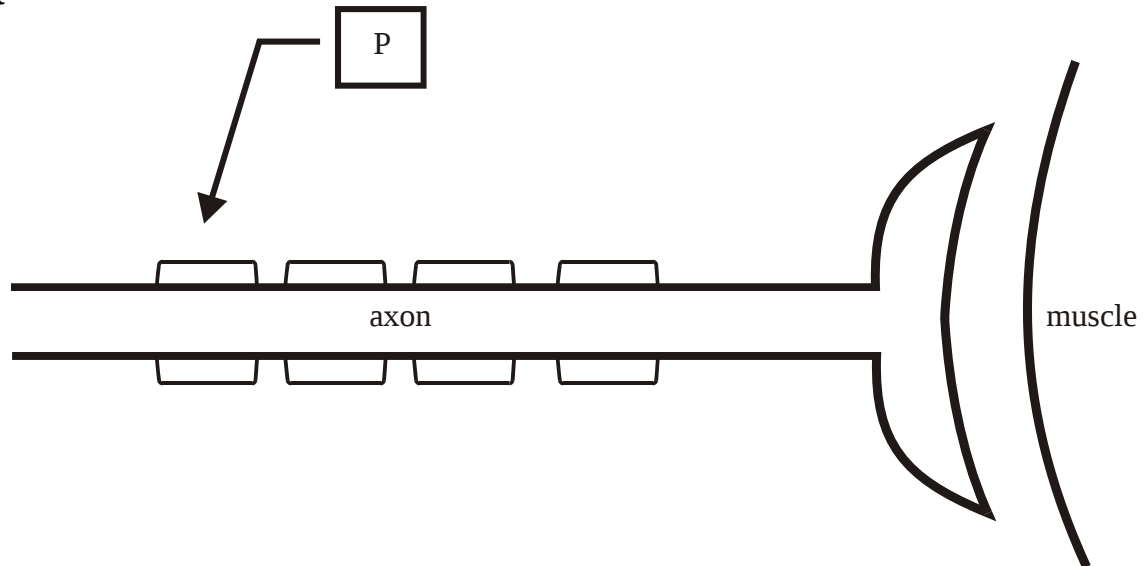


Figure 11

Figure 11 above represents part of a motor neuron ending at a muscle.

- a. Structures like the one labelled P are located around the axon. What is the name of structure P and what is its function?

(2 marks)

- b. The axon does not join the muscle. What is the space between the axon and the muscle called?

(1 mark)

- c. Explain how the impulse travelling along the neuron causes the muscle to contract if the neuron and the muscle are not touching each other.

(2 marks)

In South America, some indigenous people dip arrows into a liquid containing curare. When an animal is shot with the arrow, the curare has the effect of killing the animal by asphyxiation, as the respiratory muscles of the prey are unable to contract.

- d. Curare works as an antagonist against acetylcholine. Explain how curare causes paralysis.

(2 marks)

- e. The antidote for curare is an acetylcholinesterase inhibitor that reduces the degradation of acetylcholine. Explain how the antidote restores the ability of the neuron to produce muscle contraction again.

(1 mark)

Total = 8 marks

Question 7

- a. Define homeostasis.

(3 marks)

Figure 12 below represents a homeostatic feedback loop that might come into play on a hot day. It shows that the hypothalamus detects that the blood in the brain is too hot.

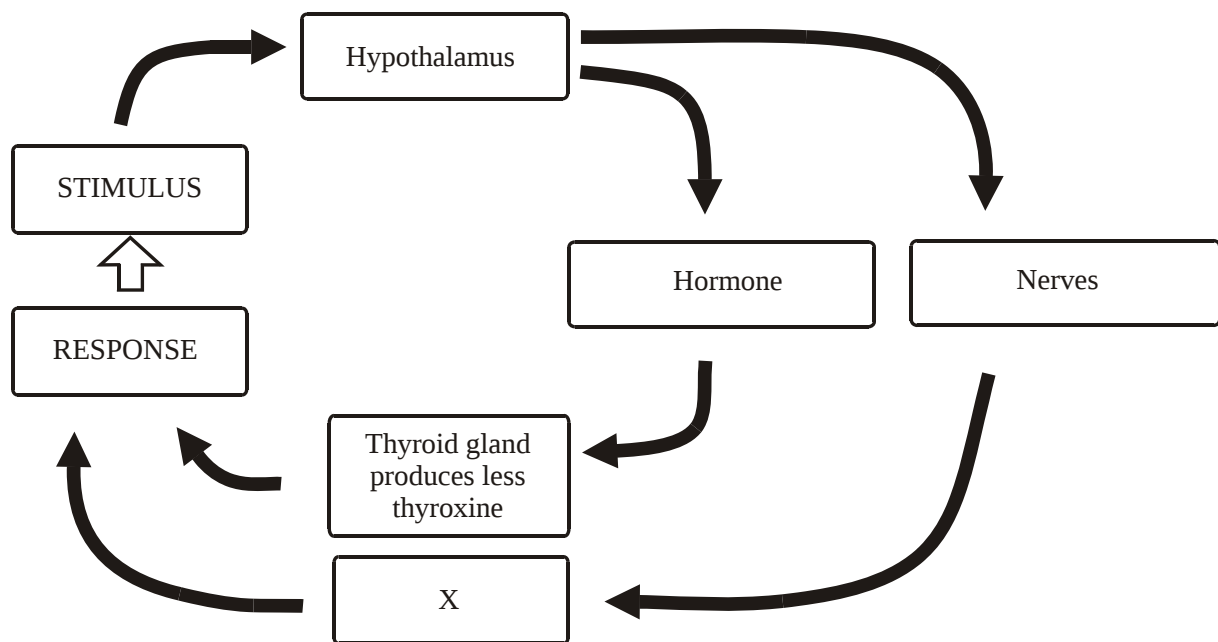


Figure 12

Questions 7 b – 7 f refer to **Figure 12** above.

- b. What is the stimulus?

_____ (1 mark)

- c. What might the effector X be?

_____ (1 mark)

- d. How would effector X produce the required response?

_____ (1 mark)

- e. Is this a negative feedback system? Explain.

 _____ (2 marks)

- f. Describe an effector that might come into play on a cold day and how it would produce a response.

(2 marks)

Total = 10 marks

Question 8

Measles is a disease caused by a virus. The symptoms include fever, discomfort, sore throat, coughing, and finally a painful and itchy rash. Very occasionally, infection leads to brain damage, pneumonia, convulsions, and sometimes death.

In 1920, over 7,000 people died of measles in the United States. The measles vaccine became available in 1963 and with widespread use of the vaccine, there were no reported deaths from measles in 1998. The vaccine contains a live virus.

If a baby, called Ben, is breast fed by his mother who once suffered from measles, Ben is protected from measles by passive immunity.

- a. Explain how Ben can have passive immunity from measles.

(1 mark)

Dom is 10 years old and has recently been diagnosed with measles.

- b. Explain why vaccinating Dom with the measles virus would not cure his measles.

(1 mark)

Betty is 18 months old. Her parents are considering getting Betty vaccinated against measles. They are concerned that the live virus in the vaccine will give her measles instead of protecting her from the disease.

- c. Why is it unlikely that the vaccine will give Betty the measles?

(1 mark)

- d. What component of the vaccine is crucial to creating immunity to measles?

(1 mark)

- e. Explain the role of B cells in creating active immunity.

(3 marks)

- f. Frank is 30 years old and was vaccinated against measles as a child. Explain how Frank's body will remove the measles virus before he shows any symptoms.

(2 marks)

Total = 9 marks

Question 9

Dracunculiasis or guinea worm disease is a parasitic infection caused by a particular species of roundworm. Humans and copepods are the host organisms. **Figure 13** below is a diagrammatic representation that shows the life cycle of this parasitic worm. Individuals who are treated and recover completely from the disease are never immune from the disease in the future.

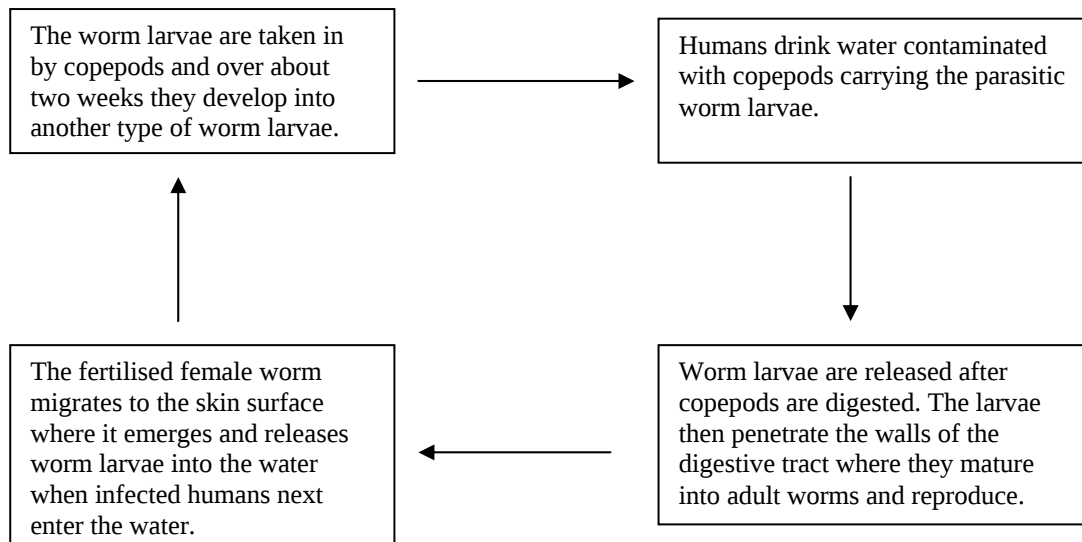


Figure 13

- a. What terms are used to describe the type of hosts that humans and copepods are in **Figure 13** above?

(1 mark)

- b. Briefly explain the meaning of the term *parasitic disease*.

(1 mark)

Guinea worm disease is not fatal, but the wound where the worm emerges can develop a secondary bacterial infection.

- c. Briefly explain which group of chemicals could be used to treat this secondary infection.

(1 mark)

- d. What is the advantage to this parasitic worm of having the copepod host in its life cycle?

(1 mark)

- e. Briefly explain why individuals who recover completely from the disease are not immune from catching the disease over and over in the future.

(1 mark)

- f. Name the term used to describe an organism that transports a disease causing microorganism between hosts but is not affected by the disease.

(1 mark)

Total = 6 marks

End of Section B

End of Practice Exam

Suggested Answers

VCE Biology 2013 Year 12 Practice Exam Unit 3

Multiple Choice Answers – Section A

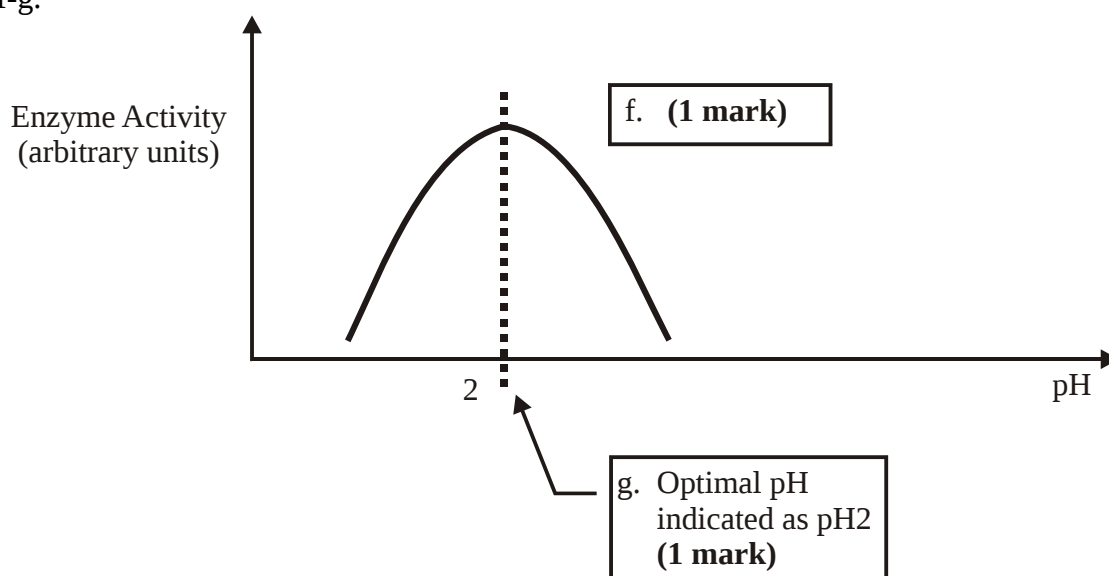
1. C	2. C	3. C	4. C	5. B	6. B	7. B	8. A	9. D	10. C
11. D	12. B	13. D	14. D	15. A	16. A	17. D	18. A	19. A	20. B
21. C	22. A	23. C	24. C	25. D	26. D	27. C	28. C	29. B	30. D
31. A	32. B	33. B	34. A	35. A	36. A	37. D	38. B	39. C	40. B
41. D	42. A								

Short Answer (Answers) – Section B

Question 1

- ase **(1 mark)**.
- Proteins **(1 mark)**.
- Substrate **(1 mark)**.
- The food protein molecules **(1 mark)** will be used up first because they are chemically altered during the reaction. The pepsin being an enzyme remains unchanged at the end of the reaction and can be used again **(1 mark)**.
- It gives the pepsin a particular 3-dimensional shape **(1 mark)** so that it can bind with the food protein molecule **(1 mark)**.

f-g.



Question 2

- Nervous system-neurotransmitters. Endocrine system-hormones. Both answers have to be correct to get one mark **(1 mark)**.

- b. From the information provided in the figure, the signalling molecule **R** would have been made from fatty acids **(1 mark)**. Since the receptor for molecule **R** is found inside the cell, the signal molecule has to move through the phospholipid bilayer in the cell membrane. For this to occur efficiently, the signal molecule would have to be lipid soluble, which means molecule **R** would be made from fatty acids **(1 mark)**.
- c. As an action potential reaches the nerve ending of an axon, the tiny vesicles that are present there and contain a neurotransmitter, release their contents into the synapse **(1 mark)**. This neurotransmitter diffuses across the synapse and interacts with specific receptors on dendrites. As a result, another action potential is generated in the next neurone so that the message can continue to its destination **(1 mark)**.
- d. Action potential **(1 mark)**.

Question 3

- a. Thymine **(1 mark)**.
- b. RNA consists of a single nucleotide chain with no base pairing; while DNA is made up of two strands of nucleotides bonded together with base pairing and forming a double helix **(1 mark)**. Furthermore, RNA has ribose sugars present in its structures, while DNA has deoxyribose sugars present **(1 mark)**.
- c. Five **(1 mark)**.
- d. Ribosomal RNA, together with proteins, are the compounds which make up the structure of ribosomes, which are the sites for protein synthesis within cells **(1 mark)**. Transfer RNA is involved in the correct sequence of assembling amino acids into a polypeptide chain. Each particular transfer RNA binds only with a specific amino acid, and each particular transfer RNA has a specific anticodon which will only bind with the correct codon on messenger RNA **(1 mark)**.
- e. Nucleolus **(1 mark)**.
- f. Codons-123: Amino acids-123. Both answers have to be correct to get one mark **(1 mark)**.

Question 4

- a. Endoplasmic reticulum **(1 mark)**.
- b. Adenosine diphosphate and inorganic phosphate. Both answers have to be correct to get one mark **(1 mark)**.
- c. The organelle found in large numbers when the cell membrane is involved in active transport would be mitochondria **(1 mark)**. For active transport to take place energy is needed. Mitochondria are the organelles which provide the largest amount of energy in the form of ATP that is required for active transport to take place across the cell membrane **(1 mark)**.
- d. Glycolysis **(1 mark)**.
- e. The metabolic pathway that releases the most energy during cellular respiration is the electron transport chain **(1 mark)**. High energy electrons are transferred along a series of steps in the electron transport chain and the energy is gradually released from these electrons to make ATP molecules. Finally, the electrons combine with oxygen molecules and hydrogen ions to form water **(1 mark)**.
- f. The advantage that an animal cell gains by converting pyruvate to lactic acid is that this stops pyruvate from accumulating in the cell and the process of glycolysis can continue releasing ATP molecules. If pyruvate accumulated in the absence of oxygen, glycolysis would stop and no ATP would be available to the cell **(1 mark)**.

- g. ATP molecules are made from ADP and inorganic phosphate and not as a completely new molecule because it is a more efficient use of energy by the cell. Less energy is required to make an ATP molecule from ADP than would be required making a completely new ATP molecule **(1 mark)**.
- h. Glucose is an energy rich molecule and if this stored energy was released in a single step, most would be lost as heat and not much used to make ATP. By breaking glucose down in a series of chemical reactions, more of the stored energy is used to make ATP and much less is lost as heat **(1 mark)**.
- i. The cristae of mitochondria are made up of many folds. This results in a large surface area being available for all the chemical reactions, that must take place during aerobic respiration, so that there is enough ATP for the cell to function at its optimum level **(1 mark)**.

Question 5

- a. Osmosis **(1 mark)**.
- b. In the case of dialysis tubing X, the volume decreased because the solution in X was dilute relative to the glucose solution in the beaker, with the result that water moved from tubing X into the beaker **(1 mark)**. On the other hand, dialysis tubing Z increased in volume because the solution in Z was concentrated relative to the glucose solution in the beaker, resulting in water moving from the beaker into tubing Z **(1 mark)**.
- c. Energy is not needed for this process since water molecules always move along or with their concentration gradient from a dilute solution to a concentrated solution across partially permeable membranes **(1 mark)**.
- d. Dialysis tubing Z **(1 mark)**.
- e. Dialysis tubing Y did not change volume because the glucose concentration in tubing Y was very similar or the same as the glucose solution in the beaker. Therefore water movement out of tubing Y into the beaker would have been balanced by the movement of water from the beaker into tubing Y **(1 mark)**.
- f. Turgor or turgidity **(1 mark)**.

Question 6

- a. Myelin sheath **(1 mark)**. Increase the speed of the impulse **(1 mark)**.
- b. Synaptic cleft or synaptic gap or synapse **(1 mark)**.
- c. The neuron releases a neurotransmitter **(1 mark)** which reacts with receptors on the muscle cells, **(1 mark)** causing the muscle to contract.
- d. Curare competes with the acetylcholine and blocks the receptor sites **(1 mark)** on the muscles so that the muscle then does not contract as they are not stimulated to do so **(1 mark)**.
- e. Acetylcholinesterase causes the acetylcholine to last longer than the curare and therefore acetylcholine competes more successfully and replaces the curare on the receptor sites, causing contraction **(1 mark)**.

Question 7

- a. Homeostasis maintains an internal environment such as glucose levels, blood concentration and temperature **(1 mark)**. The internal environment is not kept at exactly set levels but is maintained within a range **(1 mark)**. This occurs despite a changing external environment such as eating, exercise, temperature changes and infection **(1 mark)**.
- b. A rise in the temperature of the blood passing through vessels in the brain **(1 mark)**.

- c. Effectors might include sweat glands, smooth muscles in blood vessels or skeletal muscle. The action of these effectors would result in responses such as sweating or vasodilation or behaviour such as sitting in shade **(1 mark)**.
- d. Evaporation of sweat causes cooling. Or vasodilation brings more hot blood to the surface of the body to allow more conduction of heat into the air. Or sitting in the shade reduces heating from the sun **(1 mark)**.
- e. This is a negative feedback system **(1 mark)** because the response reduces the stimulus **(1 mark)**.
- f. Muscles shivering releasing heat. Or peripheral blood vessels constricting to reduce heat loss to the air. **(1 mark for effector, 1 mark for mechanism)**.

Question 8

- a. Ben obtains measles antibodies from the mother's milk **(1 mark)**.
- b. Vaccines will have no effect if the pathogen is already present. This is because the vaccine contains the same antigens that are present on the pathogen. Vaccines need to be given well in advance of the infection to have time to produce an immune response. **(1 mark)**.
- c. The live virus is attenuated (or weakened) **(1 mark)**.
- d. The antigen **(1 mark)**.
- e. B cells detect the presence of antigens **(1 mark)**. Some B cells remain as memory cells **(1 mark)**. In the future, when the pathogen is present, the B memory cells change into plasma cells which produce antibodies **(1 mark)**.
- f. Frank will have B memory cells which will recognise the measles pathogen. They will change into plasma cells and release antibodies to agglutinate the antigens **(1 mark)**. Macrophages will digest the agglutinated pathogen **(1 mark)**.

Question 9

- a. Humans – primary host. Copepods – secondary or intermediate host **(1 mark)**. Both answers have to be correct to get the mark.
- b. A parasite is an organism that lives on or in the body of another organism and obtains their nutrients directly from its host. If the parasite causes damage or harm to the host organism then a disease usually results **(1 mark)**.
- c. Since a secondary infection can be caused by bacteria, the group of chemicals that could be used are antibiotics. Antibiotics are particularly effective against disease causing bacteria by either inhibiting or destroying them **(1 mark)**.
- d. The advantage to the parasitic worm of having the copepod as a secondary host is that the copepod, after taking in the parasitic larvae, helps the parasite to become more widespread. Therefore the parasitic worm has a greater chance of finding new primary hosts, reducing competition and increasing its survival rate **(1 mark)**.
- e. Individuals who have had the disease and have completely recovered can contract the disease over and over again, because the way individuals get this disease is by drinking water contaminated with copepods carrying the parasitic larvae. Hence if individuals in the future continue to drink any water contaminated in this way, they will keep re-infecting themselves with the parasite **(1 mark)**.
- f. Vector **(1 mark)**.

End of Suggested Answers