**Semester 1 Edwest Examination, 2016**

**Question/ Answer**

**HUMAN**

**BIOLOGICAL**

**SCIENCE**

**Unit 3**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Time allowed for this paper**

Reading time before commencing work: ten mins

Working time for paper three hours

**Materials required/ recommended for this paper**

To be provided by the supervisor

**This Question/ Answer Booklet**

**Multiple- choice Answer Sheet**

***To be provided by the candidate***

Standard items: pens, pencils, eraser, correction fluid, ruler, highlighters

Special items: non-programmable calculators satisfying the conditions set by the Curriculum Council for this course

**Important note to candidates**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non‑personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Section** | **Number of questions available** | **Number of questions to be answered** | **Suggested working time**  **(minutes)** | **Marks available** | **Percentage of exam** | **Student Score** |
| **Section One:**  **Multiple-choice** | 30 | 30 | 40 | 60 | 30 |  |
| **Section Two:**  **Short answer** | 8 | 8 | 90 | 100 | 50 |  |
| **Section Three:**  **Extended answer** | 3 | 2 | 50 | 40 | 20 |  |
|  | | | | | 100 |  |

**Instructions to candidates**

1. The rules for the conduct of Western Australian external examinations are detailed in the *Year 12 Information Handbook 2016.* Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

**Section One**: Answer all questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

**Sections Two and Three**: Write answers in this Question/Answer Booklet.

3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.

4. Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* + Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
  + Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

**Section One: Multiple-choice 30% (60 Marks)**

This section has **30** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided. For each question shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. If you make a mistake, place a cross through that square, do not erase or use correction fluid, and shade your new answer. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time for this section is 30 minutes.

1. The direction in which a nerve impulse travels is always
2. dendrite 🡪 cell body 🡪 axon
3. axon 🡪 cell body 🡪 dendrite
4. cell body 🡪 dendrites 🡪 axon
5. dendrites 🡪 axon 🡪 cell body
6. It is incorrect to say that a synapse is
7. a cytoplasmic connection between two types of nerve cell in a neural circuit.
8. located between an axon ending of one neuron and a dendrite of another.
9. only able to allow the transmission of a nerve impulse in one direction.
10. a region of functional contact that can be bridged chemically by a neurotransmitter.
11. Stimulation of the parasympathetic nervous system leads to an increase in
12. dilation of the bronchioles.
13. rate of perspiration.
14. pressure of blood in the aorta.
15. rate of peristalsis.
16. Following increased secretion of adrenaline, dilation would occur in the arterioles supplying blood to the
17. skin.
18. skeletal muscles.
19. small intestine.
20. kidneys.
21. Which of the following descriptions correctly refers to the corpus callosum?
22. large bundle of nerve fibres connecting cerebral hemispheres
23. region of the cerebellum that analyses and interprets information
24. largest part of the brain divided into two hemispheres
25. region of the cerebrum that receives information from the body’s receptors
26. Receptors carry messages into the central nervous system via the
27. efferent division of the nervous system.
28. afferent division of the nervous system.
29. somatic division of the nervous system.
30. autonomic division of the nervous system.
31. Information from the body’s receptors passes through the discrete areas of the cerebrum in the order
32. motor, sensory, association.
33. motor, association, sensory.
34. sensory, motor, association.
35. sensory, association, motor.
36. When a decrease in water concentration of the blood occurs, which of the following series of events brings about osmoregulation?

|  |  |  |  |
| --- | --- | --- | --- |
|  | ADH Production | Permeability of kidney tubules | Volume of urine produced |
| a | increased | increased | decreased |
| b | increases | decreased | decreased |
| c | decreased | increased | decreased |
| d | increased | increased | increased |

1. The initial stages of a marathon are fuelled largely by glucose released from glycogen stored in the
2. liver and skeletal muscles.
3. skeletal muscles and adipose tissue.
4. adipose tissue and bone marrow.
5. bone marrow and liver.
6. The adrenal medulla releases
7. cortisol.
8. glucagon.
9. insulin.
10. adrenaline.
11. Which element causes vesicles to release neurotransmitters into the synaptic cleft?
12. magnesium
13. potassium
14. sodium
15. calcium
16. Which of the following statements is correct?
17. an antibody stimulates the body to produce antigens
18. an antibody is always composed of a polysaccharide
19. an antigen stimulates white blood cells to produce antibodies
20. an antigen is always composed of viral proteins
21. Compared with the secondary response, antibody formation during the primary response is normally found to
22. reach a higher level.
23. be maintained for a longer time.
24. occur at a much more rapid rate.
25. be unable to prevent the disease.
26. An autoimmune disorder results from the boy’s failure to recognise its
27. ‘self’ antibody signature.
28. ‘self’ antigen signature.
29. ‘non-self’ antibody signature.
30. ‘non-self’ antigen signature.
31. The human body is defended against viral invasion by
32. T-lymphocytes functioning as phagocytes which engulf pathogens.
33. macrophage producing cell-bound antibodies which act against viruses.
34. B-lymphocytes producing antibodies which act against the virus.
35. monocytes functioning as phagocytes which produce antibodies.
36. A deficiency in which neurotransmitter is commonly linked to Alzheimer’s disease?
37. acetylcholine
38. serotonin
39. adrenaline
40. dopamine
41. Penicillin is a widely used in the treatment of certain types of infection. Which of the following types of infection would penicillin be an effective treatment?
42. viral
43. bacterial
44. fungal
45. parasites
46. Which of the following is a typical behavioural response to a rise in body temperature?
47. vasodilation of skin arterioles
48. taking a cold drink
49. increasing the room temperature
50. adding layers of clothing
51. Which of the following hormones is secreted as a response to long-term stress?
52. adrenaline
53. cortisol
54. noradrenaline
55. glucagon
56. Which line correctly identifies the components of the stimulus response model?
57. stimulus 🡪 receptor 🡪 effector 🡪 modulator 🡪 response
58. receptor 🡪 stimulus 🡪 modulator 🡪 effector 🡪 response
59. stimulus 🡪 receptor 🡪 modulator 🡪 effector 🡪 response
60. receptor 🡪 modulator 🡪 effector 🡪 stimulus 🡪 response
61. Which of the following is a property of most bacteria but not a virus?
62. contains both DNA and RNA
63. contains no DNA or RNA
64. contains only DNA
65. contains only RNA
66. Aldosterone is released by
67. adrenal medulla.
68. adrenal cortex.
69. posterior pituitary gland.
70. anterior pituitary gland
71. Which of the following receptors detects changes to blood gas concentrations?
72. osmoreceptors
73. thermoreceptors
74. chemoreceptors
75. nociceptor
76. Lyme disease is spread by ticks. This is an example of
77. airborne transmission.
78. transmission by vector.
79. transmission by body fluids.
80. transmission by ingestion.
81. An antigen is
82. any substance capable of causing disease.
83. any substance capable of bringing on a fever.
84. any substance capable of causing a specific immune response.
85. any substance capable of causing a non-specific immune response.
86. Sleep is regulated by the
87. thymus gland.
88. thyroid gland.
89. pineal gland.
90. adrenal gland.
91. An investigation was carried out into the effect of increasing the concentration of carbon dioxide in the air on a person’s breathing.

The table below shows how increasing the percentage of carbon dioxide in the air affects the volume of air inhaled each minute.

|  |  |
| --- | --- |
| **Carbon Dioxide Concentration in the air (%)** | **Volume of air inhaled (litres/ minute)** |
| 1 | 9 |
| 2 | 10.5 |
| 3 | 11 |
| 4 | 12.5 |
| 5 | 19 |
| 6 | 22 |
| 7 | 40 |

The concentration of carbon dioxide is

1. control variable.
2. dependent variable.
3. independent variable.
4. none of the above.
5. During which of the following activities would it be most important for humans to have voluntary control over their breathing?
6. watching a scary movie
7. running a marathon
8. singing in a choir
9. playing tennis
10. The respiratory centre is found in which part of the brain?
11. cerebrum
12. cerebellum
13. hypothalamus
14. medulla oblongata
15. A minor increase in which of the following gases would bring about a significant increase in the breathing rate?
16. hydrogen
17. oxygen
18. nitrogen
19. carbon dioxide

**End of Section One**

**Section Two: Short answer 50% (100 Marks)**

This section has **eight** (**8)** questions. Answer **all** questions. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
* Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

**Suggested working time for this section is 90 minutes.**

**Question 31 (15 marks)**

The diagram outlines some of the divisions of the nervous system.

The Nervous System

Peripheral Nervous System

Central Nervous System- Brain and Spinal Cord

Efferent Division

(Motor)

Afferent Division

(\_\_\_\_\_\_\_\_\_\_\_)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Involuntary)

\_\_\_\_\_\_\_\_\_\_\_

(Voluntary)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(Quiet Conditions)

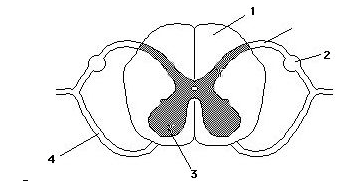
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(Fight or Flight)

1. Complete the diagram above. (5 marks)
2. Name and describe three (3) ways in which the nervous system is protected. (6 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The diagram below shows a cross section of the spinal cord



1. (i) Identify the structures labelled 2 & 4 (2 marks)

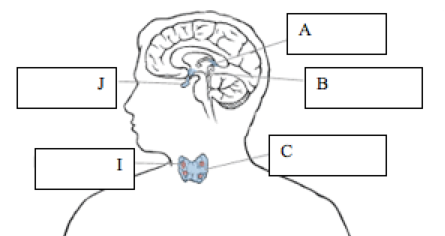
2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(ii) The diagram shows areas of grey and white matter found within the spinal cord. These sections are labelled 1 & 3 in the above diagram. Outline the difference between grey and white matter. (2 marks)

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**Question 32 (10 marks)**



1. Use the above diagram to complete the table below. You must identify the name of the gland, a hormone produced by the gland and the effect of the hormone. (6 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Gland** | **Name of Gland** | **Example of hormone produced** | **Effect of Hormone** |
| C |  |  |  |
| I |  |  |  |

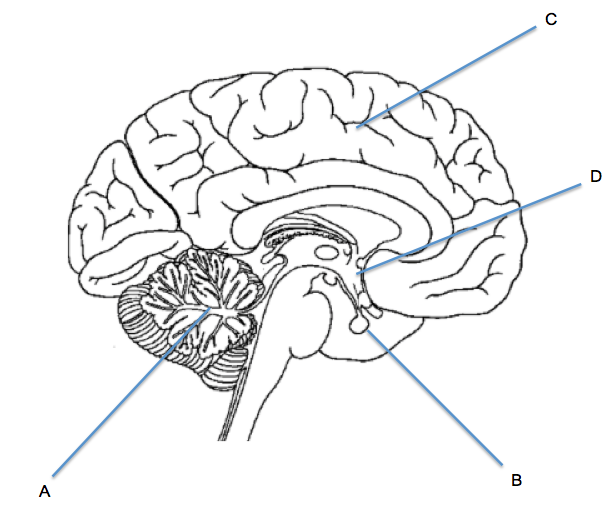
As we grow older, it is common for gland C to no longer function normally.

1. Name one (1) dysfunction of gland C and briefly outline a possible cause, symptom and treatment for this condition. (4 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 33 (11 marks)**

Use the diagram below to answer the following questions.



1. Complete the table below by filling in the name of each structure and briefly describing the function of each. (4 marks)

|  |  |  |
| --- | --- | --- |
| Letter | Name of structure | Function of Structure |
| A |  |  |
| B |  |  |

1. Describe the relationship between structures B and D. (4 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. A patient is in a coma in hospital. They have sustained a brain injury to the area labelled C in the diagram and are currently unconscious. Despite this injury, their breathing rate is normal.

Briefly explain why their breathing rate remains normal even though they have a brain injury. (3 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 34 (10 marks)**

Insulin is a protein hormone and aldosterone is a steroid hormone.

1. Outline how each of these types of hormone brings about changes to their specific target cell. (4 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. The nervous and endocrine systems both deliver messages within the body. Complete the table below to outline differences between the action of the nervous system and endocrine system. (6 marks)

|  |  |  |
| --- | --- | --- |
|  | ***Nervous System*** | ***Endocrine System*** |
| ***Speed*** |  |  |
| ***Duration*** |  |  |
| ***Transmission*** |  |  |
| ***Nature*** |  |  |
| ***Cells affected*** |  |  |
| ***Type of response*** |  |  |

**Question 35 (15 marks)**

Janet is in her mid 40’s. She has always led a healthy, active lifestyle. She recently injured her knee and is currently fasting in preparation for a surgical procedure to repair her knee. She has not eaten for several hours and feels very hungry. Her doctor has assured her that her blood glucose levels are stable.

1. Describe the homeostatic mechanism that will allow her blood glucose to remain stable throughout this time of fasting. (7 marks)

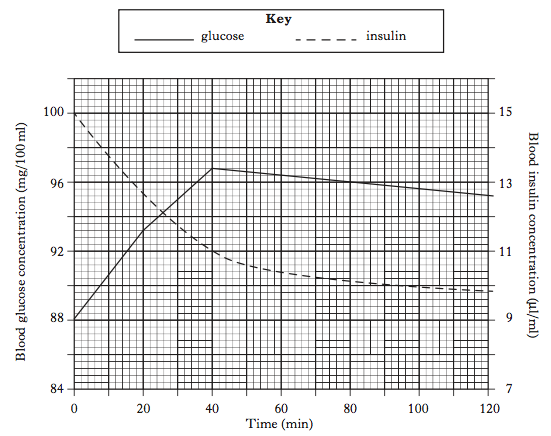
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During her hospital stay, Janet chats to two women her age. One of the women suffers from type 1 diabetes while the other has type 2 diabetes.

1. Outline three (3) differences between type 1 and type 2 diabetes. (6 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The graph below shows the blood glucose and insulin concentration of an athlete running in a marathon.



During the marathon, adrenaline is released into the athlete’s blood.

1. Explain the importance of adrenaline to the runner during the marathon. (2 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Question 36 (15 marks)**

The body has several lines of defence that prevent pathogens from entering and thus causing disease. As part of the 1st line of defence, external defences and protective reflexes work to stop the majority of pathogens entering the body.

1. Outline four (4) external defences, describing the role they play in protecting the body from disease. (8 marks)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Over the course of an illness such as the flu, a person may develop a fever. Describe what happens to a person’s body when a fever develops.

(6 marks)

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1. Explain why a fever may be beneficial. (1 mark)

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**Question 37 (11 marks)**

The table below shows the decline of Helper T cells in a person with HIV.

|  |  |
| --- | --- |
| ***Table of Helper T cells in a Person with HIV*** | |
| **Time (Years)** | **Helper T Cells (cells/ mm3)** |
| 0 (Infection) | 1000 |
| 1 | 950 |
| 2 | 900 |
| 3 | 800 |
| 4 | 760 |
| 5 | 720 |
| 6 | 410 |
| 7 | 400 |
| 8 | 300 |
| 9 | 180 |
| 10 | 100 |
| 11 | 120 |
| 12 | 75 |
| 13 | 40 |
| 14 | 25 |

1. Plot the data from the table onto the graph below. (Additional graph paper can be found at the end of this question/ answer paper). (5 marks)

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1. Helper T Cells play a crucial role in the specific immune responses of the body.
2. Briefly outline the role of Helper T Cells. (2 marks)

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1. Explain why people infected with HIV commonly die from other infections (e.g. influenza and pneumonia) rather than HIV. (2 marks)

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1. At what points on this graph may the person be at risk of developing a secondary infection? (2 mark)

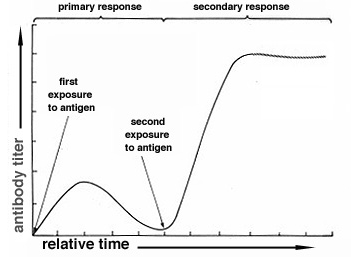
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**Question 38 (13 marks)**

The Zika virus is the most recent viral epidemic to be featured in media reports.

The Zika virus is spread by mosquitos. An infected mosquito will pass the virus on via its bite.

The following graph represents the primary and secondary response of a person who had been exposed to the Zika virus on two separate occasions.



1. Explain the shape of the above graph and the difference between the primary and secondary exposure on the person involved. (6 marks)

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1. Vaccines are produced in several different ways. Name three (3) types of traditional vaccine and give a brief description of each . (6 marks)

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1. A person has been vaccinated against the flu. Despite being vaccinated, they can still develop the flu. Explain why this is possible. (1 marks)

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**End of Section Two**

**Section Three: Extended answer 20% (40 Marks)**

This section contains three (3) questions. You must answer **two (2)** questions. Write your answers in the space provided.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

* Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.
* Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question(s) that you are continuing to answer at the top of the page.

Responses could include clearly labelled diagrams with explanatory notes; lists of points with linking sentences; clearly labelled tables and graphs; and annotated flow diagrams with introductory notes.

Suggested working time: 50 minutes.

Answer any **two (2)** questions from Questions

**End of Questions**

**Question 39 (20 marks)**

Two runners are training for an upcoming marathon. After training for several hours they are both red, hot and sweaty.

1. Outline all of the mechanisms that would allow them to maintain homeostasis.

(14 marks)

1. One of the runners begins to hyperventilate. He removes a paper bag from his backpack and starts breathing into it. After a few minutes, his breathing rate returns to normal.

Explain why breathing into a paper bag would help his breathing rate return to normal. (6 marks)

**Question 40 (20 marks)**

During a cooking lesson, a student accidently touches a hot tray in the oven. She notices that she has removed her hand from the hot tray without giving it any thought.

1. Describe the mechanism that would protect her from serious injury. (5 marks)
2. After a few hours, the student notices a burn mark on her hand. She also notices that the area around the burn is starting to become quite red, swollen and painful. Explain what is happening around the burn on her hand. (8 marks)
3. Describe how a nerve impulse travels down the length of a neuron.

(7 marks)

**Question 41 (20 marks)**

John is in Year 1 and has recently been exposed to the chicken pox virus for the first time. He has not yet been vaccinated against chicken pox. John has a 9 year old brother who has been vaccinated against chicken pox and a 3 week old baby brother who is currently breastfeeding.

1. John has developed chicken pox and his body is now producing antibodies.

Outline the process through which John’s body will produce antibodies. (7 marks)

1. Describe three (3) actions of antibodies. (3 marks)
2. John and his brothers have all gained immunity to chicken pox. Name and describe the differences between each brother’s type of immunity. (6 marks)
3. Before vaccinating their children, John’s parents researched the advantages and disadvantages of vaccination. They discussed several risks and ethical issues that often surround the topic of vaccination.

Discuss two (2) risks and two (2) ethical issues surrounding the topic of vaccination. (4 marks)

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Question 31 Spinal reflex Accessed 28th February 2016

<http://www2.sluh.org/bioweb/bi100/outlines/neurology.htm>

Question 32 Endocrine glands Accessed 28th February 2016

<http://geniso.dynu.com/endocrine-diagram>

Question 33 Unlabelled brain cross section Accessed 26th February 2016

<http://www.fotosearch.com/LIF147/h301027/>

Question 38 Primary/ secondary Response Graph Accessed 4th February 2016

<http://textbookofbacteriology.net/immune.html>