Aquinas College Examination Semester 1, 2019

Question/Answer booklet

11 ATAR Human Biology

Student Name: _____

Teacher: Nicholls / Goodlet

Time allowed for this paper

Reading time before commencing work: ten minutes
Working time: two hours and thirty minutes

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 (blue/black preferred), pencils (including coloured), sharpener, eraser, correction fluid/tape, ruler, highlighters

Special items: non-programmable calculators approved for the use in this examination

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

See next page

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

Instructions to candidates

1. The rules for the conduct of the Western Australian Certificate of Education ATAR course examinations are detailed in the Year 12 Information Handbook 2019. 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 then shade your new answer. Do no erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

   Section Two: Write your answers in this Question/Answer booklet. Whenever possible, confine your answers to the line spaces provided.

   Section Three: Consists of three questions. You must answer two questions.
   Tick the box next to the question you are answering.

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

4. Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

See next page

Section One: Multiple Choice **30% (30 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 box through that square then shade your new answer. Do not erase or use correction fluid/tape. No marks will be given if more than one answer is completed for any question.

Suggested working time: 30 minutes.

---

1. The rate of facilitated diffusion across a plasma membrane is limited by

   (a) the thickness of the plasma membrane.
   (b) the temperature.
   (c) the number of protein molecules.
   (d) the number of carrier molecules.

2. In which organ does the process of deamination take place?

   (a) Kidneys
   (b) Lungs
   (c) Liver
   (d) Large intestine

3. The word equation for deamination is written

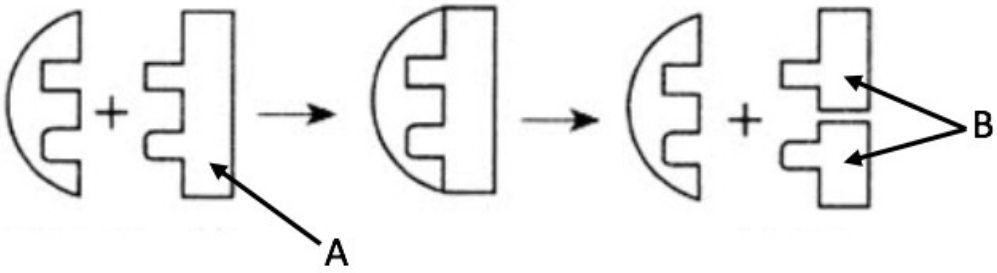
   (a) carbohydrate + ammonia → amino acids + oxygen.
   (b) ammonia + oxygen → carbohydrate + amino acids.
   (c) amino acids + carbohydrate → ammonia + oxygen.
   (d) amino acids + oxygen → carbohydrate + ammonia

4. The Golgi apparatus

   (a) stores proteins.
   (b) produces proteins.
   (c) packages proteins.
   (d) breaks down proteins.

See next page

Questions 5 & 6 refer to the diagram below



5. In the diagram above, the structure labelled A is the

(a) enzyme.
(b) substrate.
(c) products.
(d) co-factor.

6. The structures labelled B have been formed after

(a) a catabolic reaction.
(b) an anabolic reaction.
(c) a synthesis reaction.
(d) a redox reaction

7. Active transport is best defined as

(a) movement of molecules against the concentration gradient from high to low concentration.
(b) movement of molecules along the concentration gradient from low to high concentration.
(c) movement of molecules along the concentration gradient from high to low concentration.
(d) movement of molecules against the concentration gradient from low to high concentration.

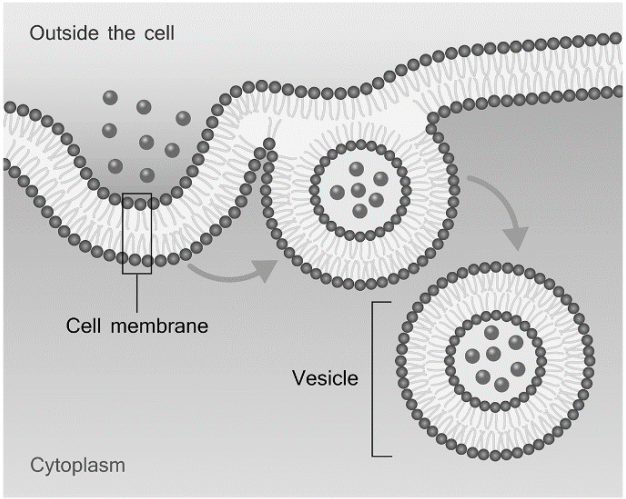
See next page

8. The lymphatic system is involved in protecting the body from disease.

Which line in the table below identifies features of lymph capillaries and lymphatic vessels?

	Lymph capillaries	Lymphatic vessels
(a)	Smaller and more permeable than blood capillaries	Contain valves and are under high pressure
(b)	Larger and more permeable than blood capillaries	Contain valves and area under low pressure
(c)	Smaller and less permeable than blood capillaries	Do not contain valves and are under high pressure
(d)	Smaller and more permeable than blood capillaries	Do not contain valves and are under low pressure

Question 9 refers to the image below.



9. Which cellular transport process is responsible for the effect shown above?

(a) facilitated diffusion
(b) active transport
(c) exocytosis
(d) endocytosis

See next page

10. The function of the renal corpuscle (Bowman's capsule) is

    (a) filtration of blood and reabsorption of glucose.
    (b) formation of filtrate and reabsorption of water.
    (c) filtration of blood and formation of filtrate.
    (d) formation of filtrate and filtration of water.

11. The enzyme pepsin is secreted by the

    (a) stomach and digests proteins.
    (b) pancreas and digests proteins.
    (c) stomach and digests lipids.
    (d) duodenum and digests lipids.

12. In the past, children who were paralysed due to polio would have to spend up to a week at a time in an iron lung. An iron lung was used to help people who have trouble breathing. It consists of a cylinder in which the pressure alternates from higher than atmospheric pressure to lower than atmospheric pressure. The patient is put in an iron lung with his or her head outside the cylinder with an air-tight seal around the neck.

    An iron lung must take the place of the

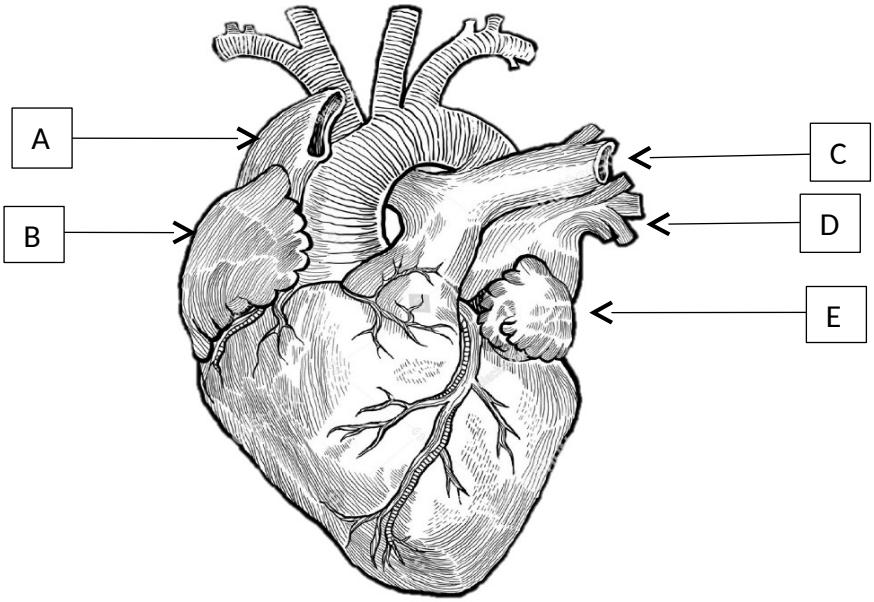
    (a) lungs.
    (b) bronchial tube.
    (c) diaphragm and intercostal muscles.
    (d) nasal and mouth cavities.

13. The correct order for the four levels of organisation from simplest to more complex are

    (a) cell, organ, tissue, system.
    (b) cell, tissue, organ, system.
    (c) system, organ, tissue, cell.
    (d) system, tissue, organ, cell.

See next page

Questions 14 and 15 refer to the image below.



14. The part of the heart labelled '**C'** in the diagram above is the

(a) aorta.
(b) superior vena cava.
(c) pulmonary artery.
(d) pulmonary vein.

15. What is the function of the structure labelled '**C'** in the diagram above?

(a) to carry blood from the body into the right ventricle
(b) to carry blood from the right ventricle to the lungs
(c) to carry blood from the lungs to the right ventricle
(d) to carry blood from the body into the left atrium

16. The pulmonary vein differs from other types of veins because it transports

(a) oxygenated blood and has valves.
(b) oxygenated blood and does not have valves.
(c) deoxygenated blood and has valves.
(d) deoxygenated blood and does not have valves.

See next page

17. A blood transfusion may be necessary if a person loses too much blood. It is critical that the person receives the correct blood type. Receiving the wrong blood type could cause

(a) agglutination.
(b) asphyxiation.
(c) dissociation.
(d) clotting.

18. A person who is blood type O can receive blood from type

(a) A and O only.
(b) O only.
(c) A and B only.
(d) A, B and O.

19. A person who is blood type AB can receive blood from

(a) A and O only.
(b) O only.
(c) A and B only.
(d) A, B and O.

20. Co-enzymes and co-factors allow enzymes to function correctly by

(a) changing the shape of the active site.
(b) increasing the rate of reaction.
(c) control the products that re produced.
(d) preventing the denaturation of the enzyme.

21. After the complete breakdown of one glucose molecule, how many ATP are produced?

(a) 2-4
(b) 8-12
(c) 30-32
(d) 36-38

22. The skin acts as an excretory organ. It excretes

(a) nitrogenous waste.
(b) water.
(c) excess oxygen.
(d) salts, urea and lactic acid.

See next page

23. Which of the following correctly identifies the pathway taken by air entering the body?

(a) larynx → pharynx → trachea → bronchioles → bronchi → alveoli
(b) pharynx → larynx → trachea → bronchioles → bronchi → alveoli
(c) larynx → pharynx → trachea → bronchi → bronchioles → alveoli
(d) pharynx → larynx → trachea → bronchi → bronchioles → alveoli

24. Oxygen and carbon dioxide move into and out of cells via simple diffusion. Which of the following require a carrier protein in order to move in and out of cells?

(a) Fatty acids
(b) Digestive juices
(c) Glucose
(d) Water

25. Ribosomes are often found attached to the surface of the

(a) endoplasmic reticulum.
(b) Golgi body.
(c) nucleus.
(d) mitochondria.

26. The table below identifies the function of components of the respiratory system. Which of the following pairings is **INCORRECT**?

	Blood Vessel	***Function***
(a)	Nasal Cavity	Warm, moisture and filter air as it enters the body
(b)	Pharynx	Location of the voice box
(c)	Trachea	Providing air to and from the lungs for respiration
(d)	Bronchiole	Smallest airways that connect to each alvoli

See next page

27. The table below lists four substances that can be found inside and outside of a cell.

	EXTRACELLULAR (mg)	INTRACELLULAR (mg)
Sodium	137	10
Potassium	5	141
Magnesium	3	52
Glucose	20	90

Which of the substances in the table above will require energy to exit the cell?

(a) Sodium
(b) Potassium
(c) Magnesium
(d) Glucose

28. Which of the following is not a function of hydrochloric acid in the stomach?

(a) Digests protein
(b) Kills bacteria
(c) Activates enzymes
(d) Lowers the pH

29. Some cases of bowel cancer can be linked to a poor diet and lifestyle. If this is the case, a doctor may suggest increasing

(a) vitamin and mineral intake.
(b) water consumption.
(c) the amount of fibre in their diet.
(d) increasing the amount of oily fish in the diet.

30. A student has been investigating the effect of salt in the diet on urine production. Which of the following would make a suitable hypothesis for his investigation?

(a) Eating salty foods will increase thirst.
(b) Increasing the amount of salt in the diet proves that urine production will increase.
(c) Increasing the amount of salt in the diet decreases urine production.
(d) If you increase the amount of sat in your diet then you will become more thirsty.

End of Section One

See next page

This page has been left blank intentionally.

See next page

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

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

Additional working space pages at the end of this Question/Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/continued on and write the question number being planned/continued on the additional working space page.

Suggested working time: 90 minutes

Question 31 **(19 marks)**

Dr Smithson wanted to investigate whether or not a new drug, Lowpress, caused a decrease in blood pressure in patients who suffered chronic high blood pressure of 160/100 or more. She advertised for volunteers who suffered this condition and specified that they had to be between the ages of 45-65 years. Dr Smithson gave a dose of 20 mg twice a day to one group of 25 patients for 10 days. Another group of 25 patients received 20 mg of a placebo twice a day for 10 days. The results of the average systolic blood pressure was recorded each day in the table below.

Day	Group 1 (Lowpress)	Group 2 (Placebo)
0	175	180
1	175	175
2	172	177
3	168	170
4	160	175
5	152	160
6	145	160
7	140	172
8	130	170
9	130	172
10	125	175

(a) Write a hypothesis for the investigation.

(1 mark)

_____

_____

_____

See next page

Question 31 (continued)

(b) (i) State the independent variable.

(1 mark)

_____

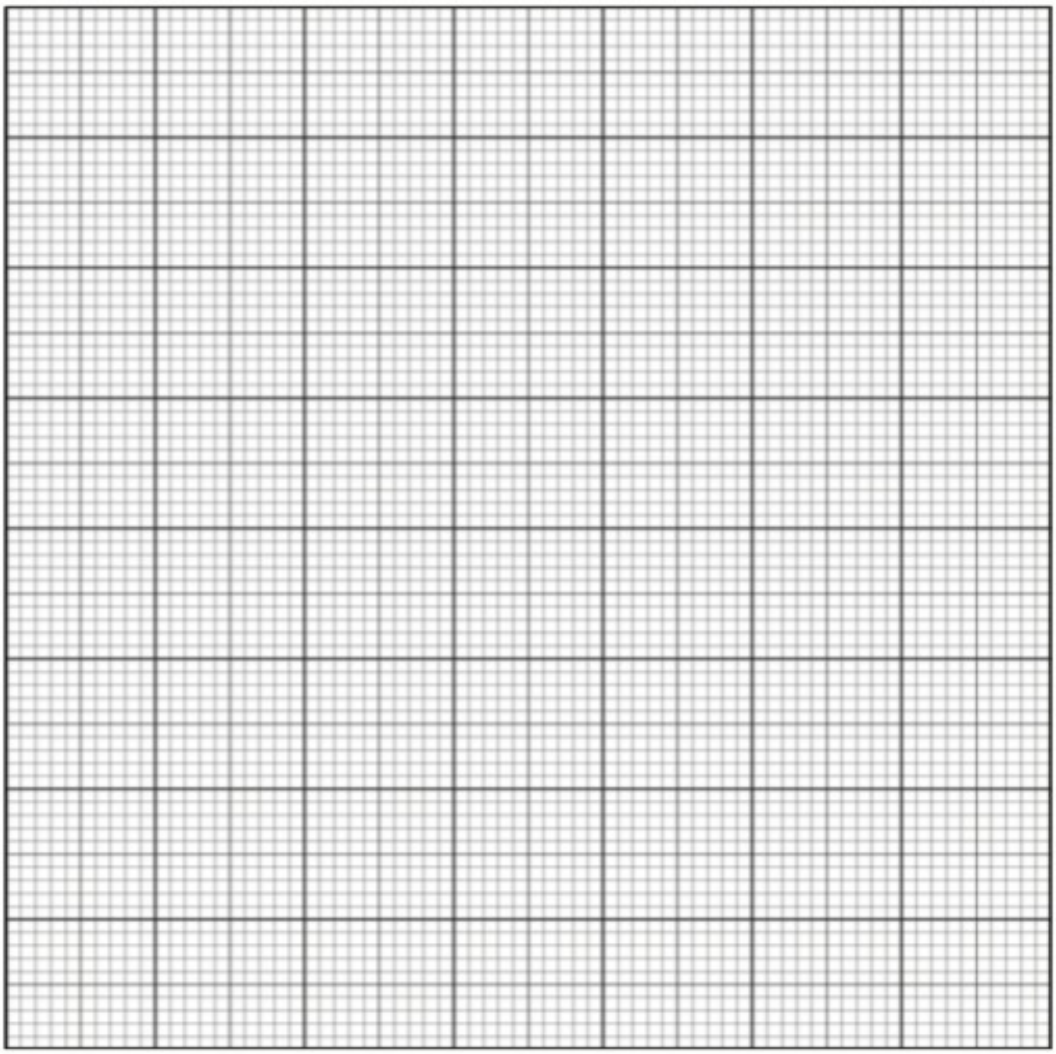
(ii) State the dependent variable.

(1 mark)

_____

(c) Graph the data for both groups on the graph paper below.

(5 marks)



A spare grid is provided at the end of this Question/Answer booklet (page 40). If you need to use it, cross out this attempt and clearly indicate that you have redrawn it on the spare page.
Question 31 (continued)

(d) List two variables that were controlled by Dr Smithson.

(2 marks)

_____

_____

_____

(e) List two variables that should have been controlled by Dr Smithson.

(2 marks)

_____

_____

(f) Explain the purpose of the group receiving the placebo.

(1 mark)

_____

_____

(g) Give a possible reason for the decrease in the blood pressure on Days 5 and 6 for the placebo group.

(2 marks)

_____

_____

_____

(h) State the conclusion that Dr Smithson would have come to based on the results.

(2 marks)

_____

_____

_____

(i) Describe two ways that the results of the investigation could have been made more reliable.

(2 marks)

_____

_____

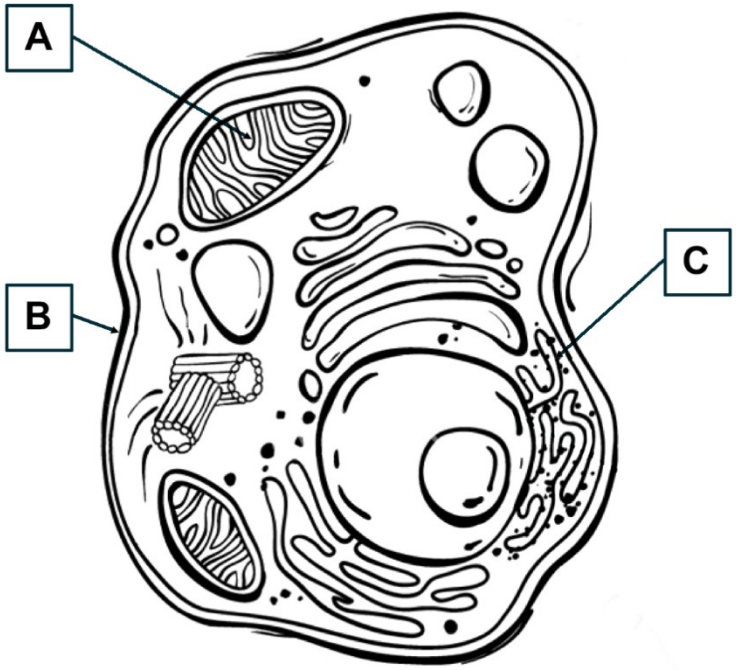
_____

See next page

See next page

Question 32 **(14 marks)**

The following is a diagram of an animal cell with organelles.



(a) Identify the following organelles labelled on the diagram.

(2 marks)

A: _____

C: _____

(b) Describe the structure labelled ‘B’ on the diagram, and state the name of the model that reflects its structure.

(3 marks)

_____

_____

_____

_____

_____

_____

See next page

Question 32 (continued)

(c) Explain why liver cells and muscle cells would have an abundant supply of the organelles labelled ‘A’.

(2 marks)

_____

_____

_____

(d) Name and describe, in detail, the process by which organelle ‘A’ produces its products in the presence of oxygen.

(7 marks)

_____

_____

_____

_____

_____

_____

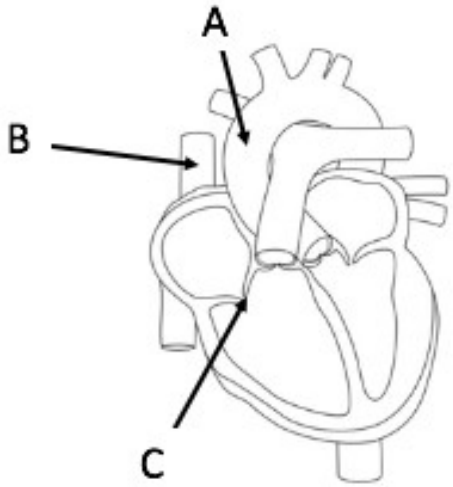
_____

_____

_____

Question 33 **(9 marks)**

The diagram below illustrates a cross section through the human heart.



(a) Identify structures A and B.

(2 marks)

A _____ B _____

(b) Describe two (2) structural differences between structure A and structure B.

(2 marks)

_____

_____

_____

_____

(c) Identify structure C and describe its function.

(2 marks)

_____

_____

_____

See next page

Question 33 (continued)

(d) Explain why the muscle on the right side of the heart is thinner than the muscle on the left.

(3 marks)

_____

_____

_____

_____

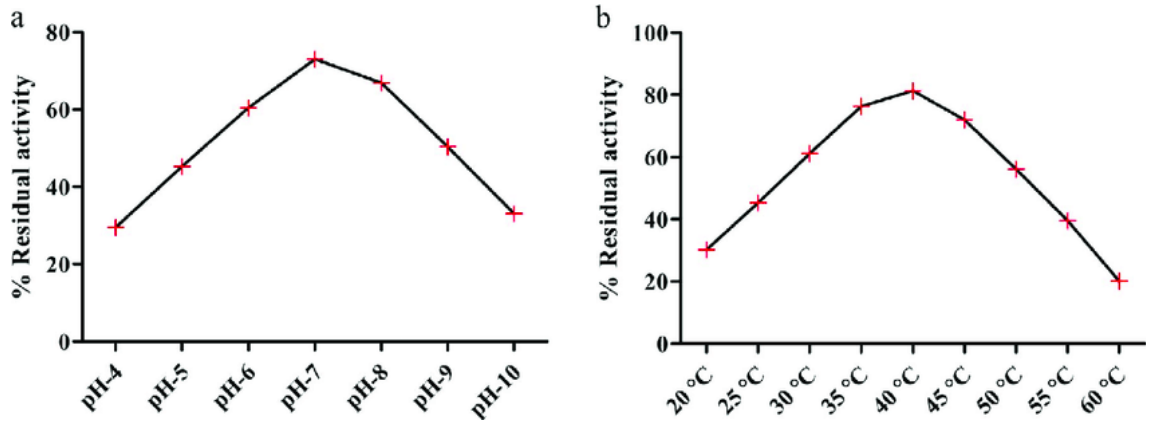
_____

_____

See next page

Question 34 **(12 marks)**

The diagrams below represents the activity of the enzyme lipase.



(a) Using the data above, state the optimum pH and optimum temperature of the enzyme lipase.

(2 marks)

_____

_____

(b) Write the word equation to show the activity of the enzyme lipase below.

(2 marks)

_____

_____

(c) Describe the effect that lipase would have on the digestion of protein. Explain your answer.

(3 marks)

_____

_____

_____

_____

See next page

Question 34 (continued)

(d) Explain how bile can assist the action of the enzyme lipase.

(3 marks)

_____

_____

_____

_____

(e) Explain why having your gallbladder removed may slowdown the rate of digestion of some foods.

(2 marks)

_____

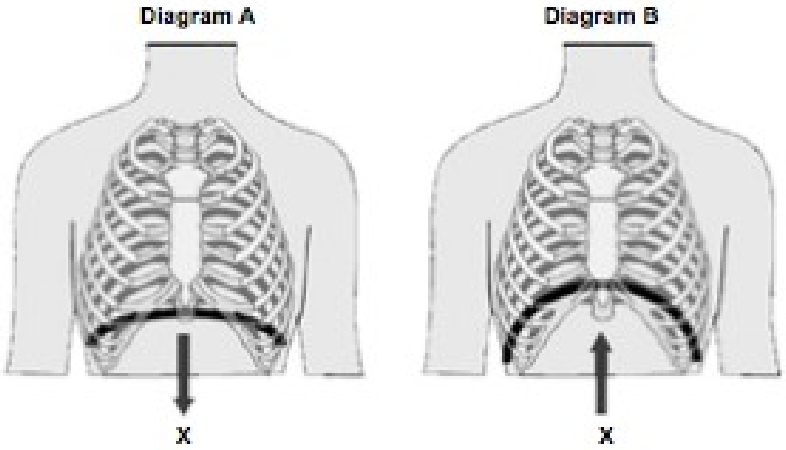
_____

_____

_____

Question 35 **(13 marks)**

The diagrams below illustrate the action of the diaphragm as a person is breathing. The diaphragm in each image is the dark line labelled X.



(a) In which of the above diagrams (diagram A or diagram B) is the person inhaling.

(1 mark)

_____

(b) Describe what is happening to the diaphragm when a person inhales.

(1 mark)

_____

_____

(c) Identify two (2) other structures that can impact the volume of air inside a person's lungs and outline the role each of these structures plays.

(4 marks)

_____

_____

_____

_____

_____

See next page

Question 35 (continued)

The respiratory system enables the intake of oxygen and the excretion of carbon dioxide. It consists of several structures that transport air into the body so that oxygen can be made available for the cells to respire.

(d) Name the microscopic structures in the lungs that enable the diffusion of gases into and out of the plasma.

(1 mark)

_____

(e) Describe three characteristics of the structures named in part (d) that allow for efficient gas exchange and explain how each characteristic is useful.

(6 marks)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

See next page

Question 36 **(12 marks)**

The table below compares the composition of glomerular filtrate and urine over a 24-hour period.

Component	***Filtrate***	***Urine***
Water	180L	1-2L
Ions including sodium, chloride	1500g	15g
Protein	2g	0.1g
Glucose	180g	0
Urea	50g	25

(a) If a person has been suffering from severe diarrhoea, what difference might you expect to see in the above data? Explain your answer.

(4 marks)

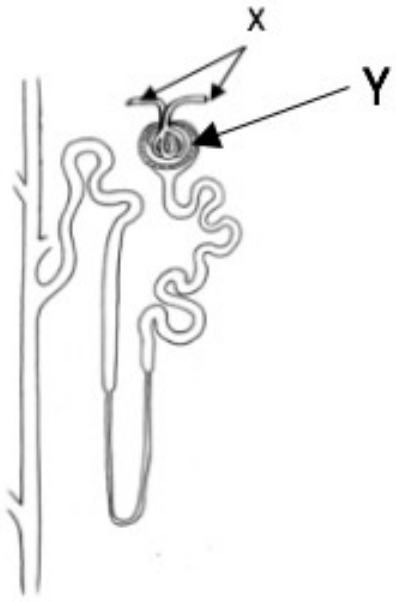
_____

_____

_____

_____

The microscopic structures within the kidney are called nephrons. A typical nephron is shown in the diagram below.



(b) Identify the structure labelled X.

(1 mark)

_____

Question 36 (continued)

See next page

(c) Describe one structural difference between these structures (X and Y) and explain why this makes them well suited to their function.

(2 marks)

_____

_____

_____

If a person is suffering from kidney failure, they must undergo dialysis several times a week. This process can last for several hours. During dialysis the person's blood is kept separate from the dialysis fluid by a membrane.

The table below shows two of the components of blood compared to the dialysis fluid.

Blood	***Dialysis fluid***
Low solute concentration	High solute concentration
Contains urea	No urea

(d) Explain the reason for the differences in solute and urea.

(3 marks)

_____

_____

_____

_____

_____

(e) Dialysis fluid must be replaced several times throughout the treatment. Explain why this must take place.

(2 marks)

_____

_____

_____

See next page

Question 37 **(13 marks)**

There are three types of muscle tissue in the body; cardiac, smooth and skeletal muscle.

(a) Complete the table below to show three (3) comparisons between smooth and skeletal muscle.

(6 marks)

Smooth muscle	***Skeletal muscle***

(b) Identify one (1) characteristic cardiac muscle has in common with smooth muscle and one (1) characteristic cardiac muscle has in common with skeletal muscle.

(2 marks)

_____

_____

_____

(c) State the definition of the term ‘tissue’.

(1 mark)

_____

_____

See next page

Question 37 (continued)

(d) (i) Epithelial and connective are two other types of tissue found in the body. State one (1) function of epithelial tissue and one (1) function of connective tissue.

(2 marks)

_____

_____

_____

_____

(ii) Give an example of where epithelial and connective tissues can be found in the body.

(2 marks)

_____

_____

_____

_____

See next page

Question 38 **(8 marks)**

A student has been training for an athletics carnival. He stops and explains that he is experiencing shortness of breath and is having difficulty breathing. His parents take him to the emergency room where a doctor carries out a blood gas test. Blood gas tests can provide medical professionals with information about the amount of oxygen and carbon dioxide in the blood.

(a) Describe the level of oxygen and carbon dioxide you would expect to find in the blood of a person who is carrying out heavy exercise. Explain your answer.

(4 marks)

_____

_____

_____

_____

_____

_____

(b) The student was also complaining of a burning sensation and extreme fatigue in his calf muscles. Explain the possible cause for what the student is experiencing.

(4 marks)

_____

_____

_____

_____

_____

_____

End of Section Two

See next page

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

This section has **three (3)** questions. You must answer **two (2)** questions. Write your answers on the lined pages provided.

Additional working space pages at the end of this Question/ Answer booklet are for planning or continuing an answer. If you use these pages, indicate at the original answer, the page number it is planned/ continued on and write the question number being planned/ continued on the additional working space 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: 30 minutes.

Answer any **two (2)** questions from Questions 39-41 below.

Question 39 **(20 marks)**

Two students are carrying out an investigation into the structure of the cell membrane. One student has suggested they place discs of red cabbage into test tubes with a small amount of water and increase the surrounding temperature by placing the test tubes into water baths of varying temperatures.

By carrying out this experiment, the students predict they will damage some of the red cabbage cell membranes. They will know that they have achieved this goal if red pigment (colour) is found in the test tubes after heating.

(a) Identify the independent, dependent and controlled variables in this experiment. Give a reason for each of your choices.

(6 marks)

(b) Describe the structure of the cell membrane and explain why the students believed increasing the temperature could help them investigate the structure.

(8 marks)

In their evaluation, the students made note of several experimental errors made throughout the investigation. The list below identifies three (3) of these errors.

1. They did not rinse the red cabbage discs.
2. They did not accurately count the number of discs in each test tube.
3. They did not wait for the water bath to come to the correct temperature below placing the test tubes inside.

(c) Explain how each of these errors could have impacted the investigation.

(6 marks)

See next page

Question 40 **(20 marks)**

The circulatory system is composed of a pump, the heart, and blood vessels that carry blood to the cells in the body.

(a) Compare the structure of the three types of blood vessels and explain how their structure relates to their function.

(12 marks)

(b) Describe how oxygen and carbon dioxide are carried in the blood.

(5 marks)

(c) Describe the function of lymph vessels in the tissues.

(3 marks)

Question 41 **(20 marks)**

The food we eat is broken down into its smallest components by the process of digestion. Digestion can be both a mechanical and a chemical process.

(a) Describe the process of digestion starting from the mouth and ending in the small intestine. In your answer, you must describe whether chemical or mechanical digestion (or both) is taking place and you must refer to the substances that ensure digestion takes place fully.

(10 marks)

The products of digestion must be absorbed in order to be of use to the body. Many of the substances involved in digestion are enzymes. Several factors can affect the functioning of enzymes.

(b) Outline the factors that can affect enzyme activity. In your answer, include any limitations of these factors that could impact the rate of reaction.

(6 marks)

A person suffering from coeliac disease cannot tolerate food that contains gluten. Gluten damages the villi in the small intestine and a person can become malnourished.

(c) Explain why a person suffering from coeliac diseases may become malnourished.

(4 marks)

See next page

See next page

See next page

See next page

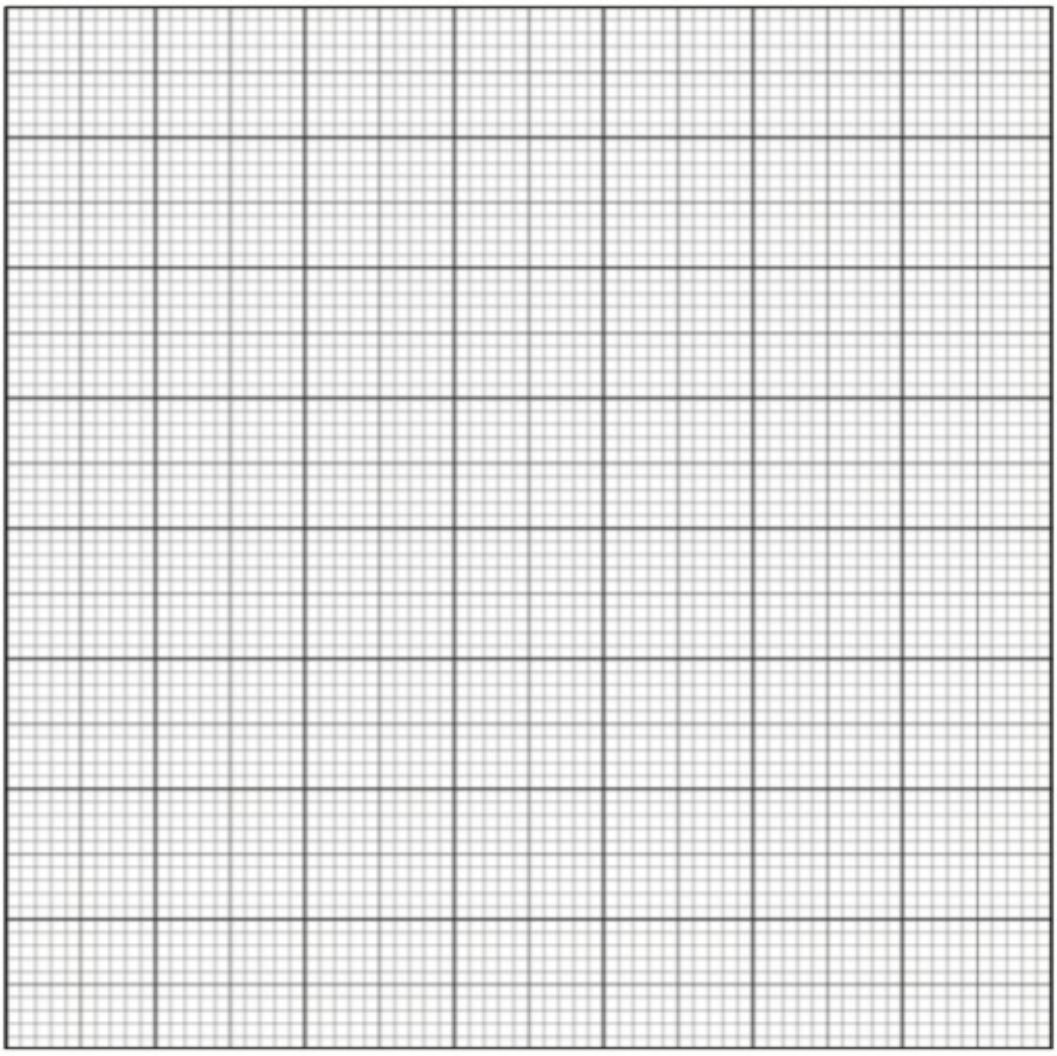
See next page

See next page

See next page

See next page

See next page



See next page