



ATAR course practice examination, Semester 1

Question/Answer booklet

HUMAN BIOLOGY

ATAR Year 11

Student Name: _____

Teacher Name: _____

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: two and half hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer booklet

Multiple-choice answer sheet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate

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

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course 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 material. 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 examination	Your mark
Section One Multiple-choice	30	30	30	45	30	
Section Two Short response	6	6	80	75	50	
Section Three Extended answer	3	2	40	30	20	
				150	100	

Instructions to candidates

- The rules for the conduct of the Western Australian external examinations are detailed in the *SCSA Year 12 Information Handbook: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.
- 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. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not 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 preferably using a blue/black pen. Do not use erasable or gel pens. Wherever possible, confine your answers to the line spaces provided.

Section Three: Consists of two parts each with two questions. You must answer one question from each part questions. Tick the box next to the question you are answering. Write your answers in this Question/Answer booklet preferably using a blue/black pen. Do not use erasable or gel pens.
- 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.
- Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Section One: Multiple choice

30% (45 marks)

This section has 25 questions. Answer all questions in the Question/Answer booklet. 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 not 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.

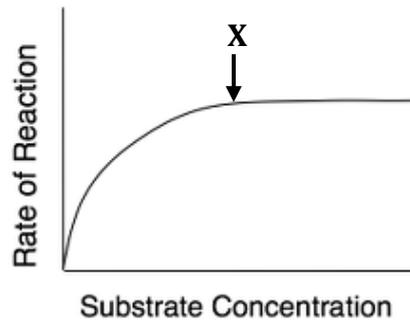
Suggested working time: 30 minutes

1. Starch, glycogen and cellulose are essential nutrients in the human body. Which of the following statements is true for these nutrients?
 - a) These nutrients are complex carbohydrates and the monomer is glucose.
 - b) These nutrients are complex lipids and the monomer is lactose.
 - c) These nutrients are complex nucleic acids and the monomer is ribose.
 - d) These nutrients are complex proteins and the monomer is amino acids.
2. The image below shows a molecule found in the membrane of living cells.



- If the molecule was chemically analysed, you would expect it to contain
- a) amino acids and phosphate.
 - b) fatty acids and phosphates.
 - c) fatty acids and glucose.
 - d) amino acids and glucose.
3. Which of the following is a catabolic process?
 - a) The conversion of glucose to pyruvate molecules
 - b) The synthesis of hormones from amino acids
 - c) The formation of triglycerides from glycerol and fatty acids
 - d) The growth of muscle tissue
 4. Which of the following best describes *metabolism*?
 - a) The optimum activity of an organism
 - b) All of the enzymes in a living organism
 - c) An enzyme-catalysed reaction in an organism
 - d) All the chemical reactions inside cells of an organism

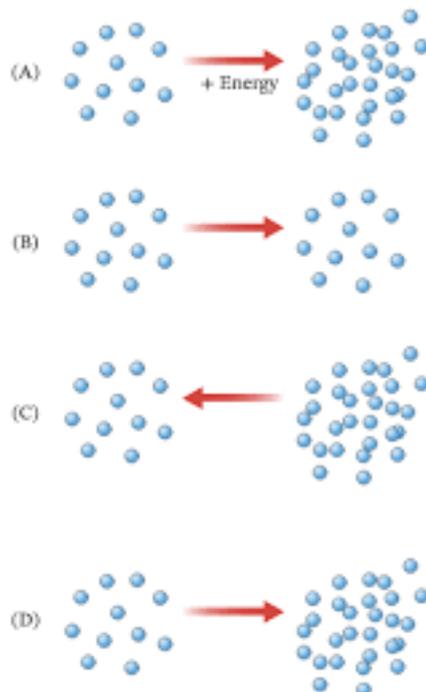
5. The graph below shows the relationship between substrate concentration and reaction rate in an enzyme-catalysed reaction.



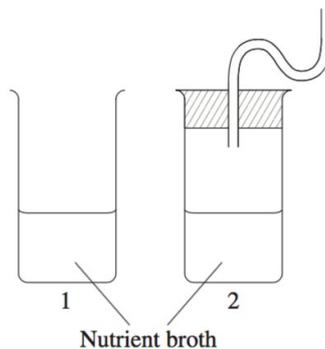
Why does the reaction rate NOT continue to increase after point X?

- a) The enzyme has been denatured.
 - b) The substrate has been denatured.
 - c) The enzyme is no longer acting as a catalyst.
 - d) All the enzyme active sites are being occupied.
6. Capillaries have thin walls to help them perform their main function. The best explanation for this is that
- a) capillaries are the smallest vessels in the body.
 - b) thin walls are an adaptation that helps diffusion.
 - c) blood flow in capillaries is under very low pressure.
 - d) thin walls maximise the surface area available for gas exchange.
7. Which statement correctly describes blood plasma?
- a) Blood plasma has a low pH to kills invading bacteria and viruses.
 - b) Blood plasma is a highly concentrated solution containing mainly sugars and salts.
 - c) Blood plasma is around 90% water with dissolved solutes.
 - d) Blood plasma has a slightly higher temperature than the rest of the human body.
8. During the process of expiration, the
- a) intercostal muscles contract and the diaphragm moves upward.
 - b) intercostal muscles relax and the diaphragm moves downward.
 - c) diaphragm contracts and decreases air pressure in the lungs.
 - d) diaphragm relaxes and decreases the volume of the lungs.
9. Which of the following structures transports both food and air?
- a) Oesophagus
 - b) Bronchus
 - c) Larynx
 - d) Pharynx

10. Which organelle is responsible for producing proteins in a cell?
- a) Mitochondrion
 - b) Nucleus
 - c) Ribosomes
 - d) Endoplasmic reticulum
11. An experiment was conducted to investigate enzyme activity. A small quantity of amylase solution was added to a solution of starch dissolved in water at 35°C. It was observed that maltose was produced. Which one of the following is the substrate in this reaction?
- a) Water
 - b) Starch
 - c) Maltose
 - d) Amylase
12. Which of the following elements are found in organic substances?
- a) Hydrogen and oxygen
 - b) Oxygen, nitrogen and sulphur
 - c) Carbon, iron and magnesium
 - d) Carbon, hydrogen and oxygen
13. Which image correctly shows active transport?



14. What is the name of the valve separating the left atrium and left ventricle of the heart?
- Pulmonary valve
 - Bicuspid valve
 - Aortic valve
 - Tricuspid valve
15. The series of steps that occur in aerobic respiration are, in order,
- glycolysis, Krebs cycle, and electron transport chain.
 - Krebs cycle, electron transport chain and glycolysis.
 - glycolysis, fermentation and electron transport chain.
 - oxidation, citric acid cycle, and electron transport chain.
16. Living things are built of four main groups of organic molecules: carbohydrates, proteins, lipids and nucleic acids. Which element is found in all organic compounds?
- Carbon
 - Oxygen
 - Hydrogen
 - Phosphorus
17. A student conducted a first-hand investigation using nutrient broth, beakers and an S-shaped delivery tube to model an experiment conducted by Louis Pasteur in 1859. The original experiment was designed to test whether sterile nutrient broth could spontaneously generate microbial life. The equipment and data collected are shown below.

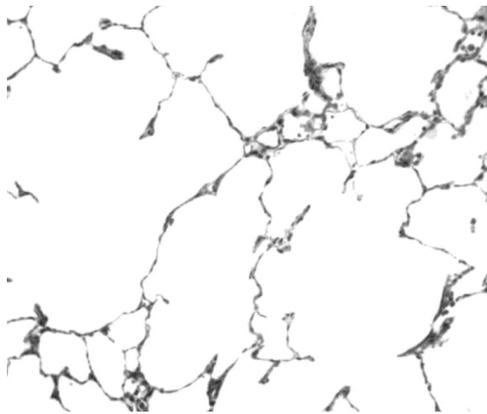


<i>Test tube</i>	<i>Observation of nutrient broth Day 1</i>	<i>Observation of nutrient broth Day 14</i>
1	Clear	Cloudy
2	Clear	Cloudy

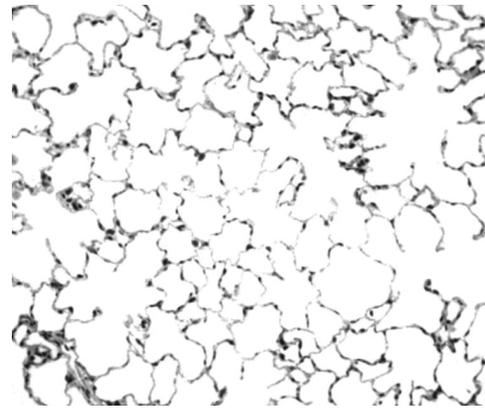
The data collected by the student are

- quantitative because data were collected for fourteen days.
- qualitative because the appearance of the broth is described.
- qualitative because this is a model of a past scientific experiment.
- quantitative because the results were recorded for two different beakers.

18. The amount of blood pumped from each ventricle of the heart per beat is referred to as
- a) heart rate.
 - b) cardiac output.
 - c) stroke volume.
 - d) ventricular force.
19. What structure in the respiratory system prevents food from entering the lungs?
- a) Pharynx
 - b) Epiglottis
 - c) Larynx
 - d) Nasal cavity
20. A patient visiting the doctor complained of breathlessness, fatigue, coughing and excessive phlegm production. The micrographs below show a sample of the patient's lung tissue and a sample of lung tissue taken from a healthy individual.



Patient's lung tissue



Lung tissue from healthy individual

The patient is likely to be suffering from

- a) emphysema.
 - b) asthma.
 - c) lung cancer.
 - d) pneumonia.
21. Which list contains only accessory in the digestive system?
- a) Duodenum, small intestine, large intestine, appendix
 - b) Pancreas, duodenum, rectum, anus
 - c) Salivary glands, pancreas, liver, gall bladder
 - d) Mouth, liver, appendix, gall bladder, anus

22. The blood vessel carrying oxygenated blood from the lungs to the heart is the
- a) Pulmonary artery
 - b) Cardiac artery
 - c) Cardiac vein
 - d) Pulmonary vein
23. Low-fibre diets slow down the movement of digested food through the large intestine. This can result in a condition known as
- a) constipation.
 - b) diarrhoea.
 - c) coeliac disease.
 - d) fibre intolerance.
24. Compared to inhaled air, exhaled air should contain a higher percentage of
- a) oxygen, carbon dioxide and water vapour.
 - b) nitrogen, carbon dioxide and oxygen.
 - c) carbon dioxide and nitrogen.
 - d) carbon dioxide and water vapour.
25. There is an upper limit on the size of a cell. Cells rarely grow much larger than microscopic size. The explanation for this is that as a cell grows, its surface area to volume ratio
- a) decreases, causing it to lose heat too easily.
 - b) increases, affecting its metabolism.
 - c) increases, making it difficult to retain cell requirements.
 - d) decreases, making it difficult to obtain cell requirements.

Section Two: Short answer

47% (70 marks)

This section has **six (6)** questions. Answer **all** questions. Write your answers in the spaces 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 page 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 that you are continuing to answer at the top of the page.

Suggested working time: 80 minutes

Question 26

[10 marks]

A group of students were investigating the effects of exercise on breathing rate. They collected the following data:

Length of time of exercise (seconds)	Breathing rate (breath per minute)			
	Trial 1	Trial 2	Trial 3	Average
Resting	41	48	48	
30	56	52	52	
60	52	56	52	
90	60	64	64	
120	68	60	68	
150	68	76	76	
180	76	80	80	

- a) Identify the independent variable.

(1 mark)

- b) Identify the dependent variable.

(1 mark)

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- c) Write a suitable hypothesis for this experiment.

(1 mark)

- d) List three (3) variables that should be controlled in the experiment.

(3 marks)

- e) In the table, calculate the averages.

(2 marks)

- f) Explain why it is important to conduct several trials and calculate averages in an investigation.

(2 mark)

Question 27

[11 marks]

- a) Cells are the basic structural and functional units of all living things. One function of cells is cellular respiration.

Write the word equation for cellular respiration.

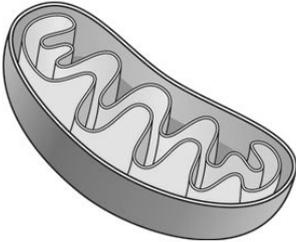
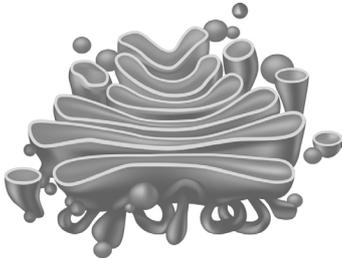
Write the balanced chemical equation for cellular respiration.

(2 marks)

b) Apart from cellular respiration, state three (3) other processes carried out by cells.

(3 marks)

c) Cell organelles maintain life processes. In the table below, name and state the function of the organelles shown.

Cell organelle	Name	Function
		
		
		

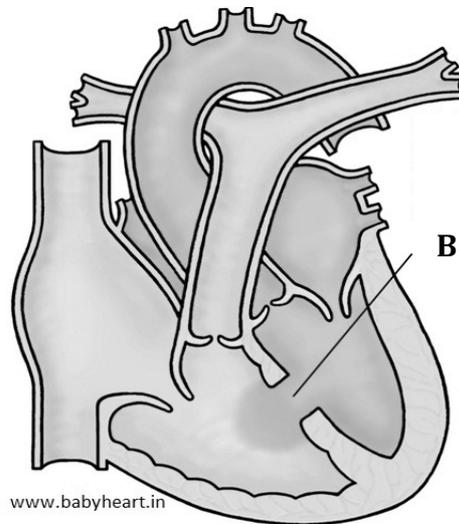
(6 marks)

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Question 28

[7 marks]

The diagram below represents the structure of the heart and its associated blood vessels.



- a) On the diagram, label the pulmonary artery.

(1 mark)

- b) Sometimes babies can be born with a ventricular septal defect (VSD) in which a “hole” occurs at point B in the heart. What effect would VSD have on each of the following features of the heart?

Feature	Effect (increase/decrease/stay the same)
Stroke volume	
Pressure of blood leaving the heart	
Heart rate	

(3 marks)

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- c) Explain how VSD would affect the oxygen concentration of the blood leaving the heart through the aorta.

(3 marks)

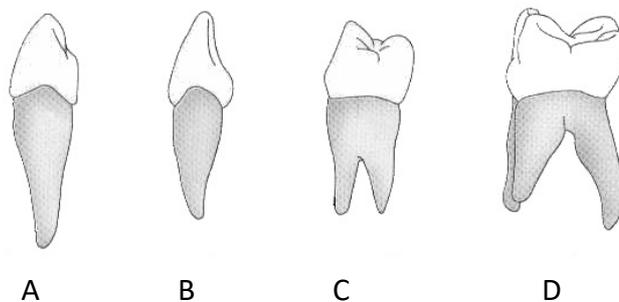
Question 29

[15 marks]

- a) Distinguish between mechanical digestion and chemical digestion.

(2 marks)

- b) The image below shows the types of teeth involved in mechanical digestion.



- i. Name the type of tooth labelled

A. _____ B. _____

- ii. State the function of the tooth labelled D.

(3 marks)

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- c) After being partially digested in the mouth, food passes to the stomach. What structure connects the mouth and the stomach?

(1 mark)

- d) Name and describe the process that moves food through the structure named above.

(3 marks)

- e) Describe the role of each of the following enzymes.

amylase _____

protease _____

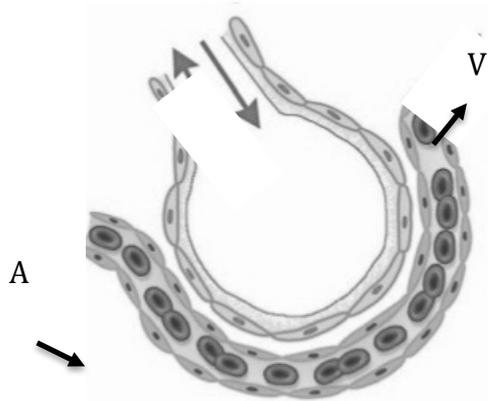
lipase _____

(6 marks)

Question 30

[15 marks]

The below shows an alveolus in the lungs.



- a) On the diagram, clearly draw and label the direction of diffusion of oxygen and carbon dioxide between the air in the alveolus and the blood.

(2 marks)

- b) What molecule gives red blood cells the ability to carry oxygen and carbon dioxide?

(1 mark)

- c) Describe and explain the difference between the blood at the arterial end (A) and the venous end (V) of the capillary.

(4 marks)

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d) Discuss four features of the alveoli that make them suited for efficient gas exchange.

- i. _____

- ii. _____

- iii. _____

- iv. _____

(8 marks)

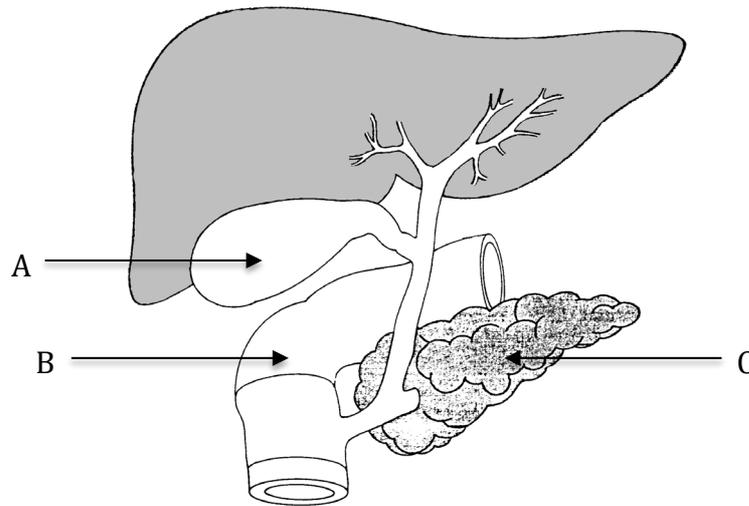
Question 31

[12 marks]

a) The liver is the largest internal organ of the human body. Explain the role of the liver in the breakdown of fat.

(4 marks)

b) The diagram below shows the liver and other organs of the digestive system.



Name the structure labelled

- A. _____
- B. _____
- C. _____

(3 marks)

c) Fatty liver disease affects about one in ten Australians.

i. State three (3) factors that increase a person's chances of developing a fatty liver.

ii. State two (2) long term consequences of fatty liver disease.

(5 marks)

END OF SECTION TWO

Section Three: Extended answer

20% (30 marks)

This section has **three (3)** questions. You must answer **two (2)** questions. Write your answers in the lined pages 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 page 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 that you are continuing to answer at the top of the page.

Responses may 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: 40 minutes

Question 32

[15 marks]

- a) Ventilation maintains a concentration gradient for the exchange of gases in the lungs. Describe the sequence of events that occur during inspiration. (7 marks)
- b) Cells can become specialised for a particular function through a process called *differentiation*. Cells with a common function are grouped together to form four types of tissues – epithelial tissue, nervous tissue, connective tissue and muscular tissue. Describe the structure and function of the four basic types of tissues. (8 marks)

Question 33

[15 marks]

- a) Describe the sequence of events that take place during one complete beat of the heart. (7 marks)

- b) Most nutrients are absorbed through the internal surface of the small intestine. Describe the features of the small intestine that make it suited for efficient absorption.

(8 marks)

Question 34

[15 marks]

- a) Many substances move into or out of a cell by diffusion. Discuss diffusion and outline four (4) factors that will increase the rate of diffusion.
- (8 marks)
- b) Every cell in the human body is surrounded by a cell membrane. The cell membrane is too small to be seen, so scientists use the fluid mosaic model to account for its behaviour and composition. Describe the fluid mosaic model.
- (7 marks)

END OF QUESTIONS

