**Insert School Logo**

# Semester One Examination 2023 Question/Answer booklet

# HUMAN BIOLOGY UNIT 1

Name: _____

Teacher: _____

## Time allowed for this paper

Reading time before commencing work: ten minutes
Working time for the 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 (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 notice 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 |
|---|---|---|---|---|---|
| Section One Multiple-choice | 30 | 30 | 40 | 30 | 30 |
| Section Two Short answer | 7 | 7 | 90 | 109 | 50 |
| Section Three Extended Answer Part 1 | 2 | 1 | 50 | 20 | 20 |
| Part 2 | 2 | 1 | | 20 | |
| | | | | **Total** | 100 |

## Instructions to candidates

1. The rules for the conduct of Western Australian examinations are detailed in the *Year 12 Information Handbook 2023: Part II Examinations.* 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. 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. 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.

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

4. 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.

See next page

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. 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.

Suggested working time: 40 minutes.

1. Where is the energy from cellular respiration stored within the adenosine triphosphate (ATP) molecule?

   (a) within the high energy electrons surrounding the atoms of the molecule
   (b) in the phosphate bond between ADP and the third phosphate group
   (c) in the cytoplasm of cells within the liver and muscle
   (d) within the covalent bonds holding the atoms together within the molecule

2. A Year 11 Human Biology student is wanting to speed up the reaction rate of pepsin - a gastric enzyme in the human body. Which of the following should she do?

   (a) raise the temperature of the solution to 50°C
   (b) ensure the pH of the solution is 7.0
   (c) add more substrate to the mixture
   (d) increase the enzyme concentration

3. The London Marathon sees over 42 000 people run 42.2 km. Which of the following would most likely be occurring in the muscles of the runners as they finish the race?

   (a) anaerobic respiration
   (b) reduction in oxygen debt
   (c) aerobic respiration
   (d) decrease in lactic acid

4. Inorganic catalysts, such as titanium chloride, are used by chemists, whereas cells use organic catalysts called enzymes. Which of the following correctly identifies an advantage and a disadvantage of using enzymes as catalysts?

| | **Advantage** | **Disadvantage** |
|---|---|---|
| (a) | can be used for a range of reactions | require constant removal of product |
| (b) | create high yields of product | can become denatured by temperature |
| (c) | can be reused | sensitive to changes in pH |
| (d) | are specific for a particular substrate | require a lot of energy |

See next page

5. Bowel cancer is an uncontrolled growth of cells in the wall of the large intestine. Which of the following is **not** considered to be a risk factor for bowel cancer?

(a) high fibre diet
(b) diet high in red meat
(c) obesity
(d) physical inactivity

6. *Helicobacter pylori* damages the lining of your stomach by creating an enzyme called urease, which makes stomach acid less acidic. Which of the following cells of the stomach lining produces hydrochloric acid?

(a) goblet cells
(b) parietal cells
(c) chief gastric cells
(d) mucous cells

7. Which of the following statements best explains why salivary amylase would **not** be responsible for starch digestion in the small intestine?

(a) the stomach has a low pH and would denature the amylase
(b) salivary amylase works best at a pH of 6-7
(c) it takes less time for starch to digest at pH 3
(d) all the starch has been digested in the mouth

8. A blood sample is drawn from a patient experiencing a sore throat and runny nose. Which of the following blood cells would you expect to be elevated in number?

(a) erythrocytes
(b) platelets
(c) thrombocytes
(d) leucocytes

9. Which of the following sets of joints allows both abduction and adduction movement?

(a) vertebrae and knuckle
(b) hip and shoulder
(c) knee and elbow
(d) ankle and wrist

See next page

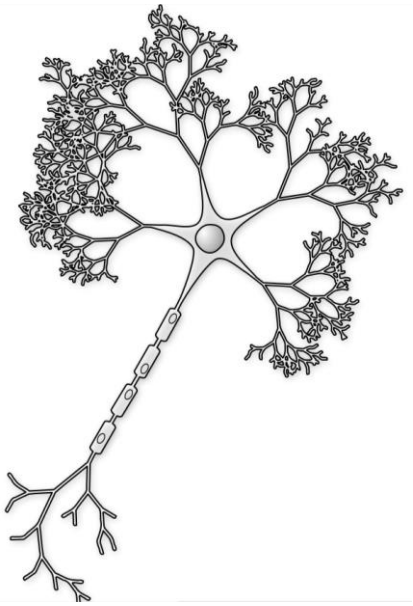
10. The heart is associated with the major blood vessels listed below:

I. pulmonary artery
II. superior vena cava
III. pulmonary vein
IV. inferior vena cava
V. aorta

Which of the following best identify the vessels associated with the heart that transport oxygenated blood?

(a) V only
(b) I and V
(c) III and V
(d) II, III and IV

Question 11 refers to the diagram of a cell type found in a particular tissue as shown below.



11. The function of the tissue this cell shown above is associated with is to

(a) carry messages between different parts of the body.
(b) line the internal cavities of organs, such as the stomach.
(c) voluntarily allow movement of muscles and bones.
(d) provide support for the body.

See next page

12. Which of the following options correctly identify the variables in a scientific experiment?

| | Controlled | Independent | Dependent |
|---|---|---|---|
| (a) | measured | changed | constant |
| (b) | changed | constant | measured |
| (c) | constant | measured | changed |
| (d) | constant | changed | measured |

Question 13 refers to the Department of Health WA data table below that shows the weekly admission and vaccination data for COVID-19 in August 2022.

| Date range | Cases | Hospitalisations | ICU | Deaths |
|---|---|---|---|---|
| Week 1 | 16 079 | 117 | 5 | 14 |
| Week 2 | 12 313 | 81 | 1 | 23 |
| Week 3 | 9 381 | 63 | 5 | 17 |
| Week 4 | 7 660 | 48 | 0 | 22 |

13. It can be concluded from the data that

(a) the number of infections increased over the month.
(b) in Week 2, 0.19% of cases resulted in death.
(c) the average ICU rate over the month was 2 admissions.
(d) the greatest rate of hospitalisations was in Week 3.

14. A doctor collected the total amount of urine produced by a patient in 24hrs. The first collection measured 1800 mL of urine, whilst the second collection was 1600 mL. Which of the following correctly states the percentage change in volume?

(a) 11% decrease
(b) 8% increase
(c) 11% increase
(d) 8% decrease

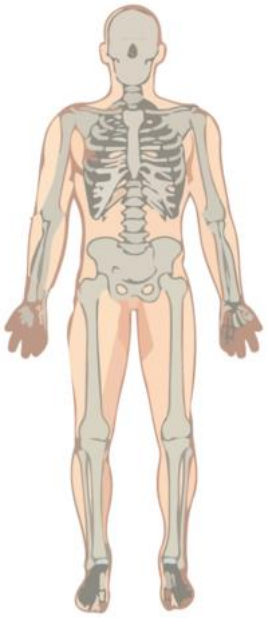
15. The effect of asthma attacks on health care costs among asthma sufferers was studied in the USA in 2012. It found that patients that suffered asthma attacks had higher health care costs than those without.

Which of the following correctly identifies the dependent variable in this investigation?

(a) number of asthma attacks per patient
(b) health care costs associated with asthma attacks
(c) number of patients experiencing asthma attacks
(d) total cost to the patient of having asthma attacks

See next page

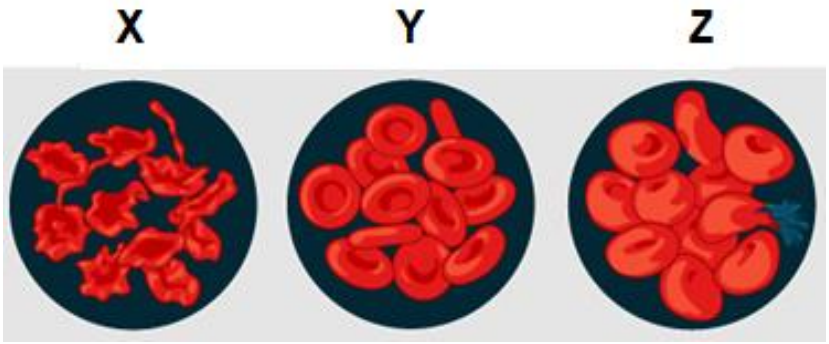
Question 16 refers to the diagram below of a human body.



16. What term best describes the level of organisation depicted in the diagram above?

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

Question 17 refers to the diagram below showing the response of erythrocytes in three separate solutions.




17. Which of the following identifies the type of solution that the erythrocytes have been exposed to in solution X, Y, and Z?

| | X | Y | Z |
|---|---|---|---|
| (e) | isotonic | hypertonic | hypotonic |
| (f) | hypotonic | isotonic | hypertonic |
| (g) | hypertonic | isotonic | hypotonic |
| (h) | hypertonic | hypotonic | isotonic |

See next page

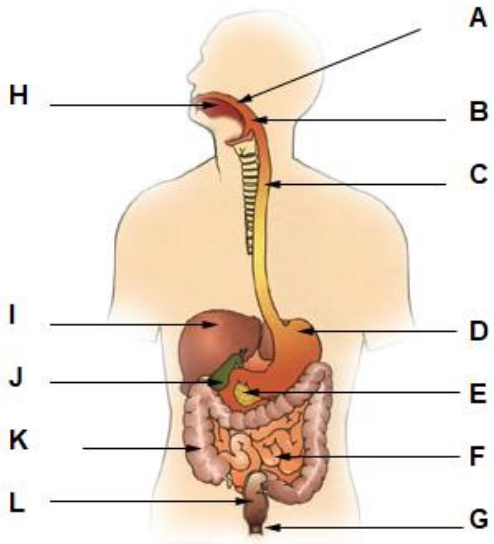
18. Bronchiectasis involves damage to the airways, specifically the cilia of the trachea. All the following would result from damaged cilia in the respiratory system **except for**

(a) increased chance of infection in the respiratory tract.
(b) inability to clear mucus from the chest.
(c) chronic nasal congestion.
(d) development of asthma.

19. Diffusion can be distinguished as either simple or facilitated. The difference between these types of diffusion is

(a) simple occurs at any location on the membrane, whilst facilitated occurs via channels.
(b) facilitated is an active process, whilst simple is passive.
(c) simple works down the concentration gradient, whilst facilitated works up the gradient.
(d) facilitated always involves the cell membrane, whilst simple does not.

Question 20 refers to the diagram of the digestive system below.




20. Which of the following are accessory organs of the digestive system?

(a) A, L, and J
(b) B, E and G
(c) E, I, and J
(d) I, J and G

See next page

21. Which of the following correctly identifies the main process and location by which simple sugars, such as glucose, are absorbed into the body?

    (a) facilitated diffusion; lacteals in the large intestine
    (b) active transport; lacteals in the small intestine
    (c) simple diffusion; blood capillaries in the small intestine
    (d) active transport; blood capillaries in the small intestine

22. Whilst playing basketball, an athlete jumped up for a rebound. Upon landing, she heard a loud pop, experienced instant bruising and was unable to straighten her knee. What tissue did she most likely injure?

    (a) muscle
    (b) cartilage
    (c) ligament
    (d) bone

23. Strength training of the arm muscles often includes bicep curls, which involves repeated flexion and extension at the elbow joint. During the process of extension, the biceps relax whilst the triceps contracts. Which of the following identifies the role of the muscles in this movement?

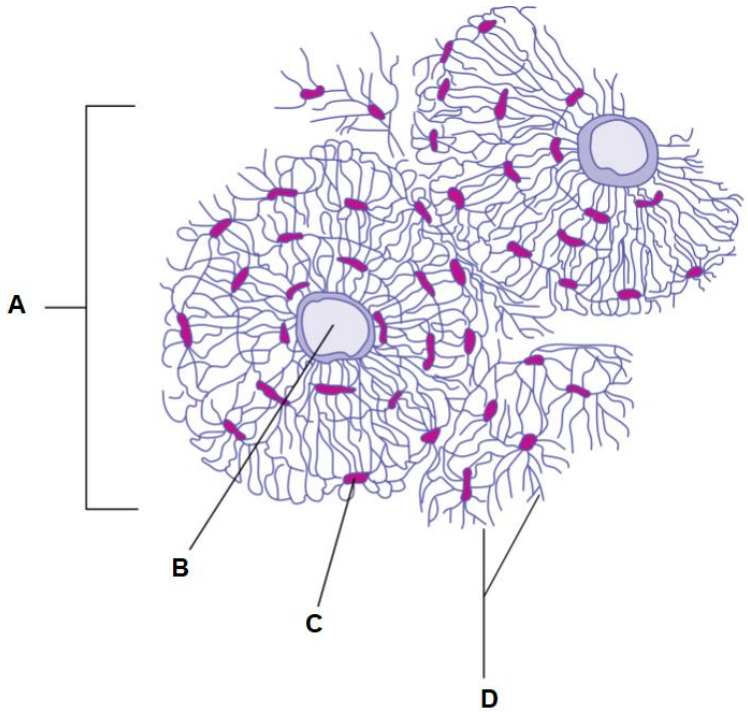
    (a) the tricep is the antagonist and the bicep is the agonist
    (b) the bicep is the synergist and the tricep is the antagonist
    (c) the bicep is the antagonist and the tricep is the agonist
    (d) the tricep is the stabiliser and the bicep is the synergist

24. Injury to the skull often results in the fracture of the bone well before any damage to the joints found there. The best reason for this is that skull joints are

    (a) slightly moveable, allowing the plates of the skull to slide past each other.
    (b) fibrous, which are very difficult to damage.
    (c) cartilaginous, that cushions the bones during impact.
    (d) synovial joints, limited in movement by the ligaments in the skull.

See next page

Question 25 and 26 refer to the microscopic structure of compact bone shown below.




25. The Haversian canal, identified by the letter B, contains

(a) capillaries and nerve fibres.
(b) osteocytes embedded with a collagen matrix.
(c) yellow bone marrow and stored fat.
(d) stores of calcium and phosphorous.

26. What is the function of the components labelled D?

(a) increase the strength of the bone by connecting the cells
(b) allow transport of materials between cells
(c) house the osteocytes allowing bone integrity to be maintained
(d) allow blood vessels and nerves to pass through the bone

27. Following a broken bone, which of the following cell types would be most common in the immediate area surrounding the break?

(a) osteocyte
(b) osteoblast
(c) osteoclast
(d) osteon

See next page

28. Leukaemia is a cancer of the tissue that forms blood, with patients often receiving platelet transfusions as part of their care. Which of the following symptoms would be associated with a low platelet count?

    (a) recurrent nosebleeds
    (b) swollen lymph nodes and an enlarged liver
    (c) high body temperatures and chills
    (d) loss of weight without trying

29. Elimination and excretion are often used interchangeably; however, biologically, they are quite different. All the following are excreted from the body **except for**

    (a) carbon dioxide.
    (b) urea.
    (c) bile.
    (d) undigested food.

30. To allow for efficient metabolism, materials must easily be exchanged across the cell membrane. Which of the following factors would **not** affect the rate of alveolar diffusion?

    (a) physical nature of the gases
    (b) chemical nature of the gases
    (c) reactivity of the gases
    (d) concentration of the gases

**END OF SECTION ONE**

See next page

**Section Two: Short answer** **50% (109 Marks)**

This section has **seven** questions. Answer **all** questions. Write your answers in the spaces provided.

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.

Suggested working time: 90 minutes.

**Question 31** **(14 marks)**

In 2002, a controlled trial was performed to determine if two procedures performed during arthroscopic surgery for osteoarthritis were effective in relieving knee pain. Participants were aged 75 or less, with 93% male and 60% Caucasian. 60 participants were given a placebo operation, whilst the other two-thirds had either one of the two procedures: a lavage or debridement. The trial ran for 2 years, with knee pain scores recorded. The results are shown below.

| | **Procedure (Average Scores on Knee Pain Scale)** | | |
|---|---|---|---|
| **Time (Weeks)** | *Placebo* | *Lavage* | *Debridement* |
| 0 | 60 | 61 | 58 |
| 26 | 57 | 59 | 56 |
| 78 | 52 | 56 | 51 |
| 104 | 55 | 55 | 53 |

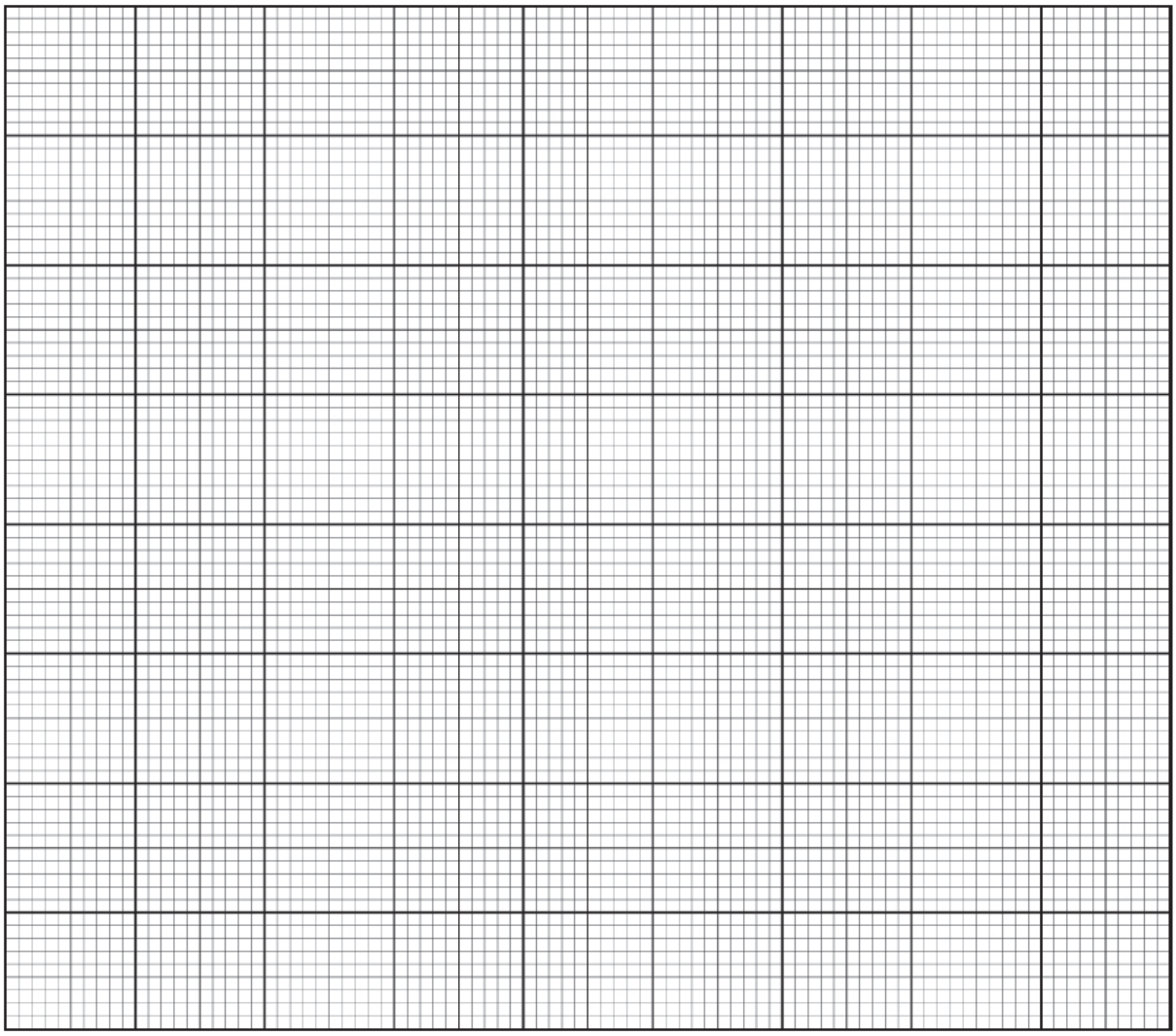
(a) Explain why the researchers included a placebo operation in this study. (2 marks)

(b) State whether the results of this study would be applicable to everyone with knee pain. Justify your answer.

(2 marks)

See next page

(c) Graph the results from the 2002 trial on the grid provided below. (5 marks)



A spare grid is provided at the end of this Question/Answer Booklet. If you need to use it, cross out this attempt and indicate that you have redrawn it on the spare grid

See next page

**Question 31** (continued)

(d) By the age of 70, everyone will have some symptoms of osteoarthritis. Outline the cause of the joint pain that osteoarthritis sufferers experience.

(3 marks)

(e) Osteoporosis is another musculoskeletal disease associated with ageing. How does osteoporosis differ from osteoarthritis?

(2 marks)

See next page

**Question 32** **(16 marks)**

The human body is made up of approximately 37.2 trillion cells, each of these with a set of specific cell organelles that maintain life processes. The production of proteins is one such important process occurring within a cell.

(a) Briefly outline the function of the following organelles regarding protein production.

(3 marks)

| Organelle | Function |
|---|---|
| Nucleus | |
| Ribosomes | |
| Golgi body | |

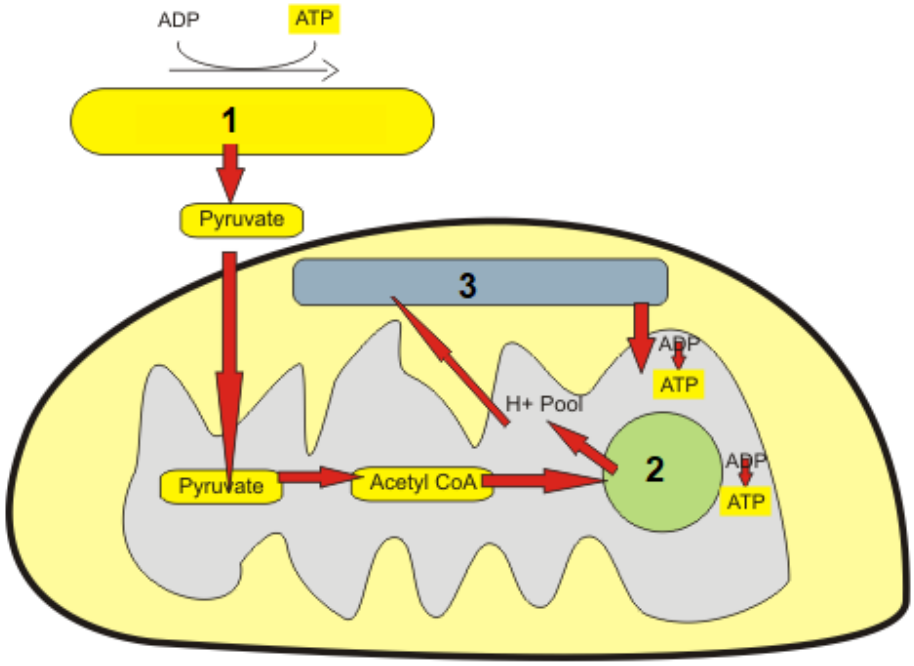
(b) Proteins can become integrated within the cell membrane. In the space below, draw a fully labelled diagram of the fluid mosaic model to represent the structure of a cell membrane.

(5 marks)

See next page

**Question 32** (continued)

The diagram below is a representation of cellular respiration within a cell.




(c) Name the processes, as well as the corresponding amount of ATP produced, at the locations identified by the numbers 1, 2 and 3.

(3 marks)

| Location | Process | Amount of ATP produced |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |

Molecular malfunctions within cell organelles are the cause of many human illnesses, such as Mitochondrial Disease. The main symptoms of Mitochondrial Disease are muscle fatigue and weakness.

(d) Give a reason why muscle is the tissue most affected by mitochondrial disease.

(1 mark)

_____

_____

See next page

(e) Describe how ineffective mitochondria would affect a cell's general function within the body.
(4 marks)

See next page

**Question 33** **(16 marks)**

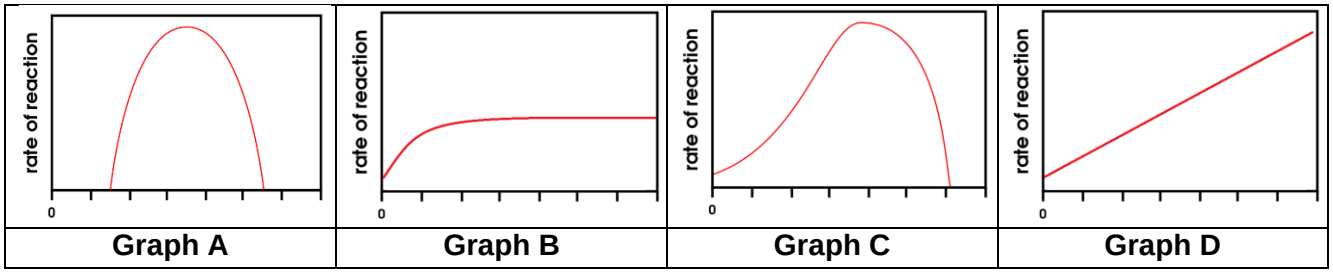
Penicillin was discovered in 1928, with the first patient treated with the antibiotic 20 years later. It works through the process of enzyme inhibition, stopping bacteria from synthesising a cell wall and therefore causing it to die.

(a) Explain how an enzyme reaction would differ in the presence of an enzyme inhibitor.

(6 marks)

(b) Several other factors can also affect the function of enzymes. Match the appropriate reactivity graphs to the factors identified below.

(4 marks)




| Graph A | Graph B | Graph C | Graph D |
|---|---|---|---|

(i) Substrate concentration: _____

(ii) Temperature: _____

(iii) pH: _____

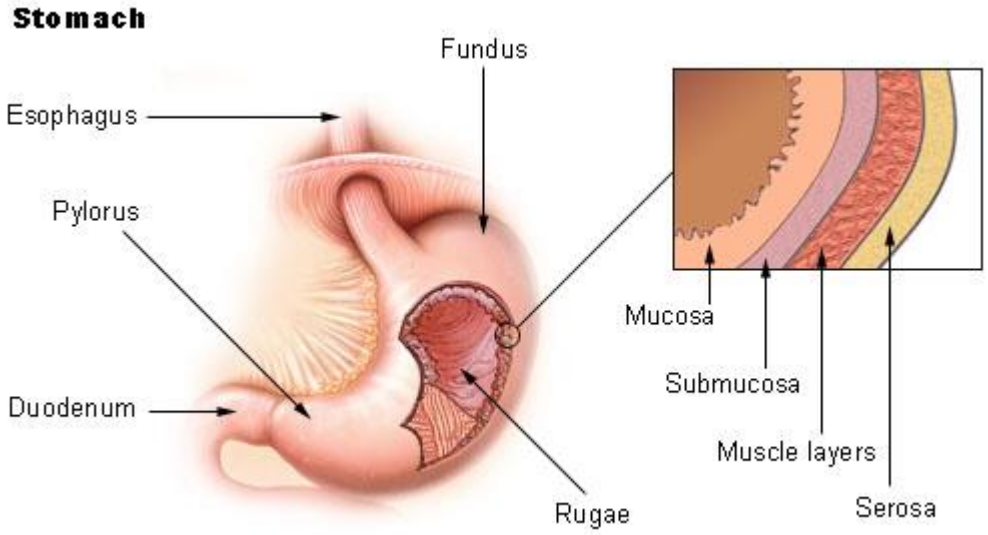
(iv) Enzyme concentration: _____

See next page

(c) Some enzymes require prior activation before they can work effectively. Identify the cell in the stomach lining that produces pepsinogen and outline how it becomes an active enzyme.

(4 marks)

A diagram of the parts of the stomach is shown below.




(d) Unlike the rest of the alimentary canal, the stomach has a third muscle layer. State the name of this muscle layer and outline why it is found in the stomach.

(2 marks)

See next page

**Question 34** **(17 marks)**

*Helicobacter pylori* is a bacterium that damages the protective mucous coating of the digestive system. This damage can lead to the formation of peptic ulcers in the duodenum.

(a) Why are peptic ulcers more likely to be found in the duodenum? (2 marks)

(b) *H. pylori* infections can also cause chronic diarrhoea in early infancy. Define diarrhoea and explain its cause.

(5 marks)

LDL cholesterol, often referred to as “bad” cholesterol, is transported into cells of the body through vesicular transport.

(c) Outline the steps involved in taking up cholesterol into a cell.

(3 marks)

See next page

(d) Is the uptake of cholesterol considered to be a passive or active process? Justify your answer.
(2 marks)

(e) Most cholesterol is produced in the liver.

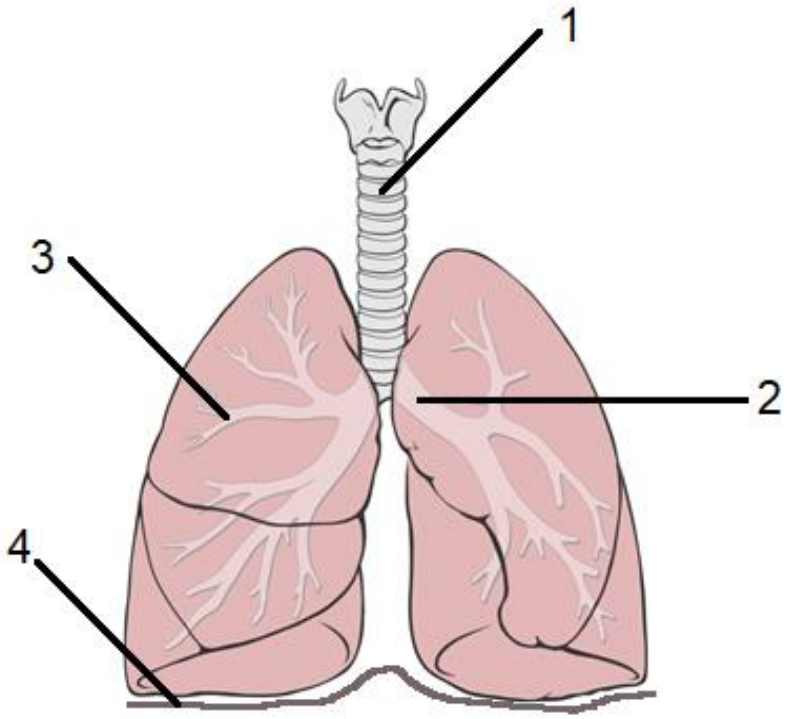
(i) What digestive substance is produced using cholesterol from the liver and where is it stored?
(2 marks)

(ii) Explain how a blockage in the duct leading into the small intestine would affect digestive function.
(3 marks)

See next page

**Question 35** **(16 marks)**

The diagram below illustrates the respiratory system.




(a) Identify the organs labelled by the following numbers: (2 marks)

1: _____

3: _____

(b) Describe how the muscle identified at label 4 in the image above is involved in inspiration. (3 marks)

_____

_____

_____

_____

See next page

(c) Describe the structure of the cartilage that gives the bronchi their strength.
(3 marks)

(d) Outline how oxygen and carbon dioxide are exchanged between alveoli and blood capillaries. (5 marks)

(e) Blood is both a tissue and a fluid. Explain why blood can be classified as a connective tissue.
(3 marks)

See next page

**Question 36** **(16 marks)**

Approximately 10% of a person's body weight is made up of blood, equating to about 5L. A loss of 40% or more of your blood volume will result in death, with blood transfusions required to stop this from occurring.

(a) Outline how molecules found on the surface of red blood cells and in the plasma are important in blood transfusions.

(5 marks)

One of the functions of blood is to transport oxygen to cells and carbon dioxide away from cells.

(b) Explain how carbon dioxide is transported in the blood. (3 marks)

See next page

Carbon dioxide is a cellular waste removed from the body via the lungs. Other wastes created in the body are removed via urine. Normal urine is composed of water, solutes and wastes, with approximately 2% being urea.

(c) What would you expect to happen to the percentage of urea in a person's urine if they ate a high-protein diet? Justify your answer.

(2 marks)

Nutrients and wastes are transferred between cells and extracellular space via transport mechanisms.

(d) Complete the table below identifying the transport mechanism associated with each of the stated processes.

(3 marks)

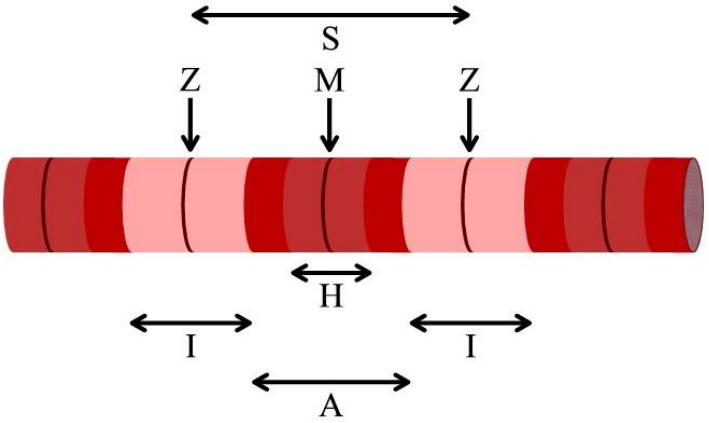
| Process | Transport Mechanism |
|---|---|
| Water-soluble vitamins being absorbed into the blood capillaries of the villi | |
| Uptake of amino acids into the villi of the small intestine after a meal | |
| Water movement from the kidney tubules into the blood | |

(e) Explain how fats are absorbed into the villi of the small intestine. (3 marks)

See next page

**Question 37** **(14 marks)**

The diagram below is an illustration of a relaxed muscle fibre.




(a) When a muscle fibre contracts, the sarcomere will shorten though the A-band will remain the same length. Explain why this occurs.

(3 marks)

(b) Outline the role of troponin and tropomyosin in the contraction of muscle fibres.

(3 marks)

Cardiac muscle tissue is involuntary, ensuring that the muscle rhythmically contracts to pump blood around the body.

(c) Briefly describe the structure of cardiac muscle tissue. (2 marks)

See next page

A microscopic image depicting two types of blood vessels is shown below.


(d) Identify the type of vessels labelled A and B. Justify your answers. (2 marks)

_____

_____

_____

(e) Erythrocytes have a very particular structure. How does the structure suit the function of the cells?

(4 marks)

_____

_____

_____

_____

_____

**END OF SECTION TWO**

See next page

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

This section contains **four** questions. You must answer **two** questions.

Questions 38 and 39 are from Part 1. Question 40 and 41 are from Part 2. Answer **one** question from Part 1 and **one** question from Part 2.

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.

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.

Suggested working time: 50 minutes

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**Part 1**

Choose **either** Question 38 **or** Question 39.

Indicate the question you will answer by ticking the box next to the question. Write your answer on pages 30–34. When you have answered your first question, turn to page 36 and indicate on that page the second question you will answer.

☐ **Question 38** **(20 marks)**

In every living cell, enzyme controlled chemical reactions take place continuously and are often linked together.

(a) State the name given to this set of reactions and describe the two types that occur in the body. Give an example of each type.

(7 marks)

Cells require nutrients in order to undertake life processes, such as growth and repair. The digestive system extracts these nutrients from the food we eat through chemical and mechanical digestion.

(b) The mouth, stomach and small intestine utilise chemical and mechanical digestion. Differentiate between the two types of digestion and list the functions associated with the three named parts of the digestive system.

(13 marks)

See next page

**Question 39** **(20 marks)**

Crohn's disease is an autoimmune condition which damages the lining of the small intestine, leading to inflammation.

(a) Describe the lining of a healthy small intestine and outline why an individual with unmanaged Crohn's tend to lose weight.

(8 marks)

Emphysema is a lung disease most often attributed to smoking. People with emphysema have damaged alveoli and decreased blood flow.

(b) Explain how the structure of the lungs allow for efficient gas exchange. Predict some of the symptoms that emphysema patients would exhibit.

(12 marks)

See next page

Question number: _____

See next page

Question number: _____

See next page

Question number: _____

See next page

Question number: _____

See next page

Question number: _____

See next page

**Part 2**

Choose **either** Question 40 **or** Question 41.

Indicate the question you will answer by ticking the box next to the question. Write your answer on the pages provided.

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☐ **Question 40** **(20 marks)**

(a) Outline the structure of a nephron beginning at the renal corpuscle. State the activities which occur at each region.

(14 marks)

(b) Ammonia is highly toxic to cells. Describe how ammonia is produced and how the liver processes this toxic chemical into a safer form.

(6 marks)

☐ **Question 41** **(20 marks)**

(a) The skeletal system is made up of bone that is far more than just a framework giving shape to the body. Outline the macroscopic structure of a long bone and describe how the features contribute to the functions of the human skeleton.

(14 marks)

(b) The musculoskeletal system and lymphatic system are interrelated. State two functions of the lymphatic system and briefly describe how these two systems work together to achieve these functions.

(6 marks)

**END OF QUESTIONS**

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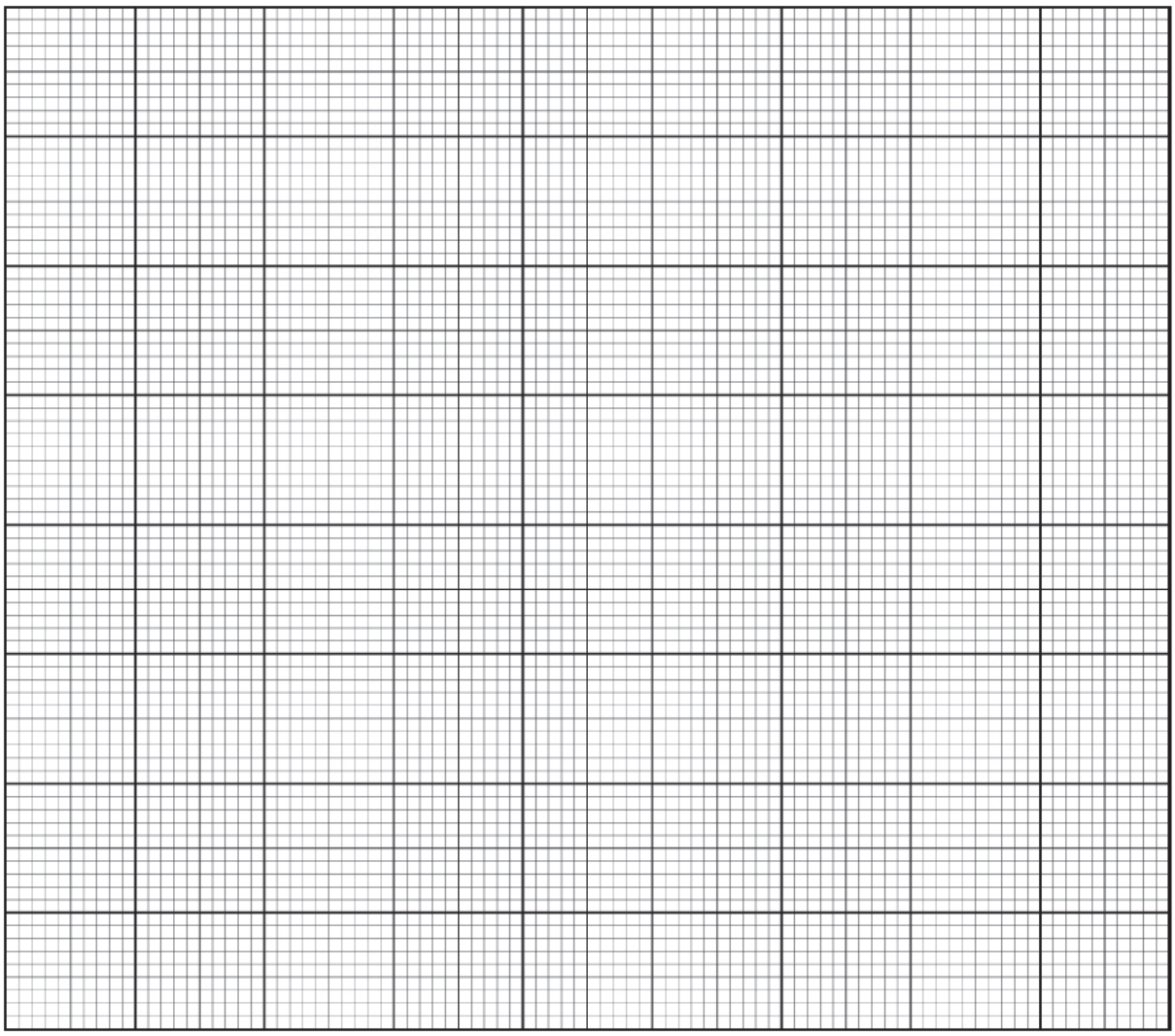
Spare graph



## ACKNOWLEDGEMENTS

**Question 11** Tissue type. Nicolas.Rougier, CC BY-SA 3.0 <http://creativecommons.org/licenses/by-sa/3.0/>, via Wikimedia Commons. Accessed on 4th October 2022, at https://commons.wikimedia.org/wiki/File: -figure-notext.svg

**Question 13** Weekly COVID-19 cases, hospitalisations and ICU Snapshot. WA Covid-19 Data Update. Access on 16th March 2023, at https://www.health.wa.gov.au/~/media/Corp/Documents/Health-for/Infectious-disease/COVID19/WA-COVID-19-data-updates/COVID-19-Weekly-Statistics-9-September-2022.pdf

**Question 16** Illustrations of bodies. Loneshieling, CC BY 4.0 <https://creativecommons.org/licenses/by/4.0>, via Wikimedia Commons. Access on 4th October 2022, at https://upload.wikimedia.org/wikipedia/commons/a/a8/XXXX_rearranged.png

**Question 17** Cells in solution. OpenStax, CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons. Accessed on 4th October 2022, at https://upload.wikimedia.org/wikipedia/commons/5/5a/0346_Concentration_of_Solutions_labeled.jpg

**Question 20** Diagram of the Digestive System. Vive la Rosière, CC0, via Wikimedia Commons. Accessed on 4th October 2022, available at: https://commons.wikimedia.org/wiki/File:Diagram_of_the_digestive_system-VOID.png

**Question 25** Transverse section of bone. Source digital bitmap graphics: BDBRecreated in vector format: Nyq, CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0>, via Wikimedia Commons. Accessed on 4th October 2022, at: https://commons.wikimedia.org/wiki/File:Transverse_section_of_bone_en.svg

**Question 31** "A controlled trial of arthroscopic surgery for osteoarthritis of the knee," *New England Journal of Medicine.* 347 (2): 81-88. 2002, July 11. Available online at: https://www.nejm.org/doi/full/10.1056/nejmoa013259

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**Question 32**

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**Question 33**

Effect of factors on enzymes. domdomegg, CC BY 4.0 <https://creativecommons.org/licenses/by/4.0>, via Wikimedia Commons. Accessed on 3rd October 2022, at https://commons.wikimedia.org/wiki/File:Effect_of_temperature_on_enzymes.svg

Stomach. NIH / National Cancer Institute, Public domain, via Wikimedia Commons. Accessed on 3rd October 2022, at https://commons.wikimedia.org/wiki/File:Illu_stomach2.jpg

**Question 35**

Lungs, simple diagram. Patrick J. Lynch, medical illustrator, CC BY 2.5 <https://creativecommons.org/licenses/by/2.5>, via Wikimedia Commons. Accessed on 3rd October 2022, at https://commons.wikimedia.org/wiki/File:Lungs_diagram_simple.svg

**Question 37**

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