

Candidate Name

Candidate Number

Centre Name

Centre Number

**Paper 1: Biology**

For Examination June 2023

(2 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

**INSTRUCTIONS:**

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Objective section consists of 25 questions, and it is essential that you attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple choice answer sheet using a soft pencil.
- Attempt all the questions from subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.

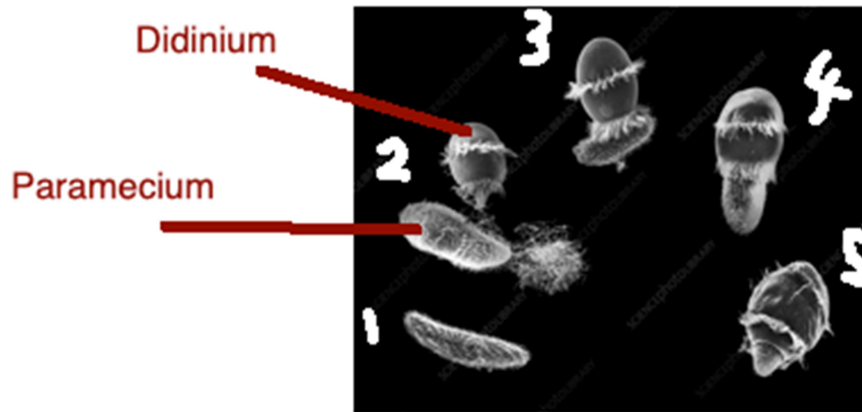
**INFORMATION:**

- This paper has a total of 100 marks.
- In objective section there are 25 questions, each carries one mark. There is no negative marking for incorrect responses.
- In subjective section, 45 marks are for extended theory and 30 marks for practical component.

The number of marks assigned for every question or its parts is indicated within brackets [ ]

## OBJECTIVE SECTION (MCQ)

- 1) The image below shows a *Didinium*, is a barrel shaped ciliate and a *Paramecium* covered in cilia in a series of timelapse steps 1 to 5.



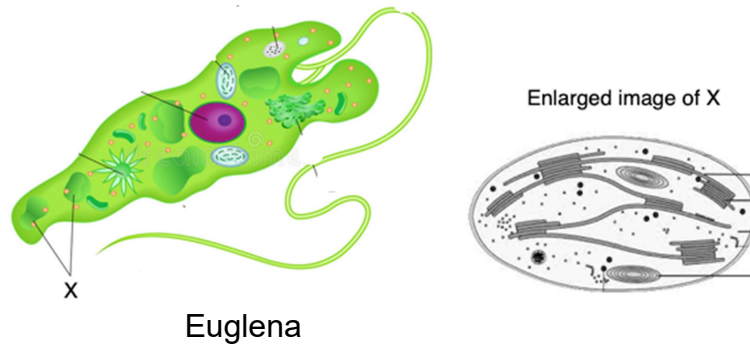
Which life process is **not** observed between step 1 to 5 in the still image?

- A – Excretion
- B - Nutrition
- C – Ingestion
- D – Movement

- 2) Which product of anaerobic respiration is responsible for creating an oxygen debt?

- A – Carbon dioxide
- B.- Water
- C – Lactic acid
- D - Ethanol

- 3) Euglena is a unicellular organism that has a range of organelles, below is an image of Euglena and an enlargement of organelle X.



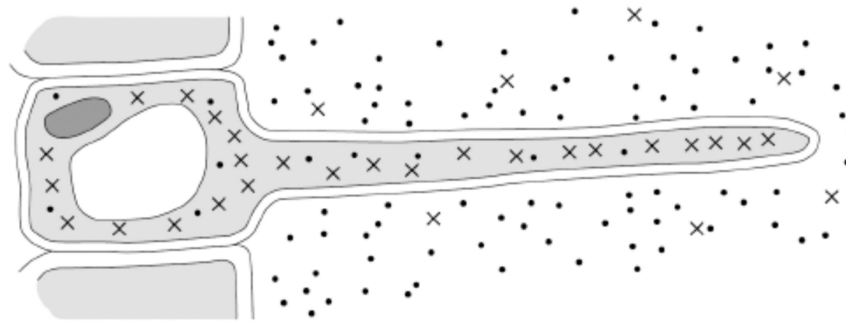
- A – Nucleus  
B – Ribosomes  
C – Mitochondria  
D - Chloroplast

4. Which row correctly describes structures found in bacteria?

	Nucleus	Cell wall	Mitochondria	Ribosomes
A	Present	Absent	Absent	Present
B	Absent	Present	Present	Absent
C	Absent	Present	Absent	Present
D	Present	Present	Absent	Present

5. What process is substance X moving into the cells as shown in the diagram?

Figure 3



- A: Diffusion
- B: Active transport
- C: Osmosis
- D: Brownian motion

6. Which elements are found both in lipids and proteins?

1. Hydrogen
2. Oxygen
3. Nitrogen
4. Carbon
5. Sulphur

- A: - All the above
- B: 1, 2 and 4
- C: 1, 3 and 4
- D: 1, 2 and 5

7. Which organ secretes bile into the small intestine?

- A: Pancreas
- B: Liver
- C: Gall bladder
- D: Wall of the small intestine

8. What are the products of chemical digestion by the action of amylase?

- A: Starch
- B: Maltose
- C: Glucose
- D: Amino acids

9. Coeliac disease is caused by gluten, which stimulates the body to attack and damage tissue in the small intestine, children affected by this have stunted growth. Suggest a mostly likely reason for this?

- A: Reduced digestion of lipids
- B: Reduced digestion of protein
- C: Reduced digestion by emulsification
- D: Reduced digestion of carbohydrates

10. A patient is suffering a deficiency disease which is affecting their eyesight, which food would be recommended to improve their eyesight?

- A: Citrus fruits
- B: Red meat
- C: Carrots
- D: Dairy

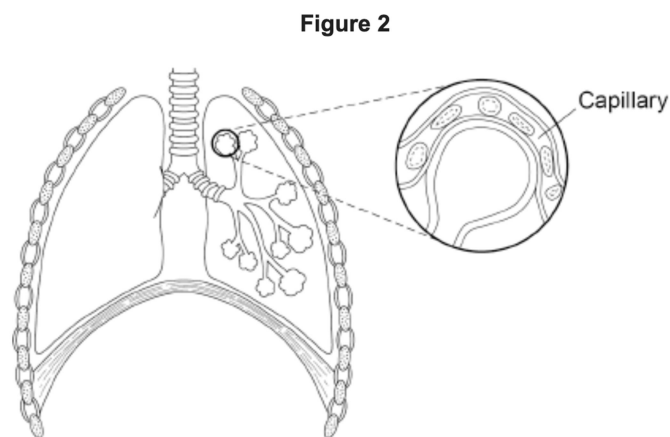
11. What is the structural feature that enables the trachea to remain open during breathing?

- A: Cartilage
- B: Muscles
- C: Elastic tissue
- D: Bronchi

12: Which is the correct statement describes changes in the respiratory system to enable exhalation?

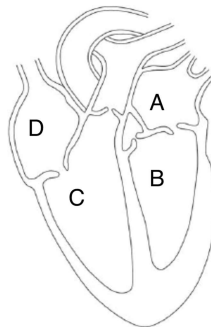
- A: External intercostal muscle contract
- B: Pressure in the thorax decrease
- C: Volume of thorax increases
- D: Diaphragm relaxes

13: Smoking can cause a variety of diseases, which disease affects the circled structure?

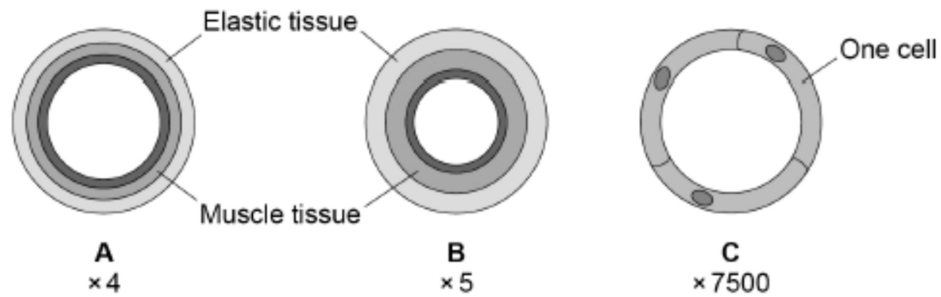


- A: Lung cancer
- B: Bronchitis
- C: Emphysema
- D: Coughing

14: Where would a pacemaker most likely be placed?



15) Blood vessel A is an important blood vessel that delivers blood from the lungs to the heart.



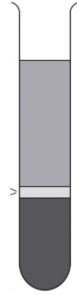
Correctly identify the type of blood vessel A?

- A: Artery
- B: Vein
- C: Arteriole
- D: Capillary

16) Which blood vessel will contain the highest concentration of glucose?

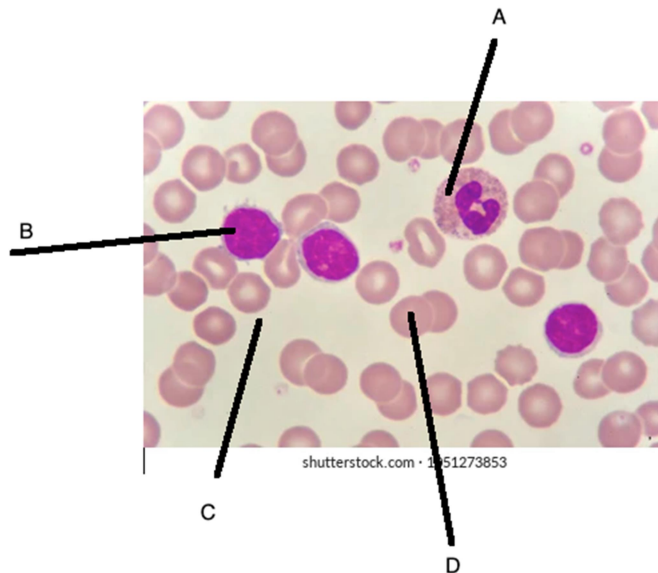
- A: Aorta
- B: Coronary artery
- C: Hepatic portal vein
- D: Vena Cava

17) A sample of blood was spun using a centrifuge, using your knowledge and the image which component of the blood could not be separated by centrifugation?



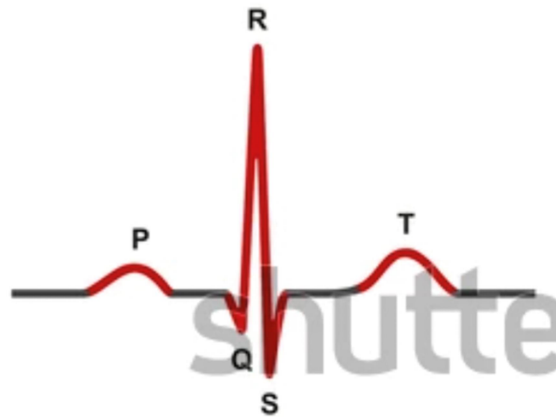
- A: Red blood cells
- B: White blood cells
- C: Platelets
- D: Plasma

18) Which component of the blood is responsible for producing antibodies?





19) A cardiogram is used to represent a singular heartbeat, as shown in the image below.



Correctly identify what process is happening at P?

- A: Atria contracting
- B: Ventricle contracting
- C: Atria relaxing
- D: Ventricle relaxing

20) A person is suffering with athletes' foot what would be the most effective treatment to be prescribed.

- A: Antibiotic
- B: Fungicides
- C: Pain killers
- D: Anti-viral drugs

21. Infants that are fed formula milk instead of breast milk are more likely to suffer with diseases due to not having what type of immunity?

- A – Artificial immunity
- B – Active immunity
- C – Natural immunity
- D – Passive immunity

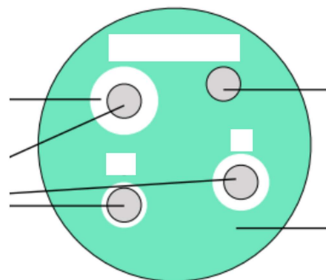
22. Stunted growth is a plant deficiency disease caused by a lack of which mineral?

- A – Potassium
- B – Iron
- C – Magnesium
- D – Nitrates

23) Excess consumption of recreational drugs can lead to various non-communicable diseases, drugs such as alcohol, nicotine, and caffeine. Which of the following symptoms is the unique to excessive alcohol consumption?

- A: High blood pressure
- B: High Cholesterol
- C: Cirrhosis
- D: Coronary heart disease

24) The image below shows the result of an aseptic technique procedure testing the effectiveness of a particular drug.



What do you understand by the term aseptic technique?

- A: A process that involves using microorganisms to make products
- B: A process by which an experiment is carried out under controlled conditions
- C: A process by which an experiment is carried out to prevent contamination from pathogens
- D: A process by which to investigate population growth of a pathogen.

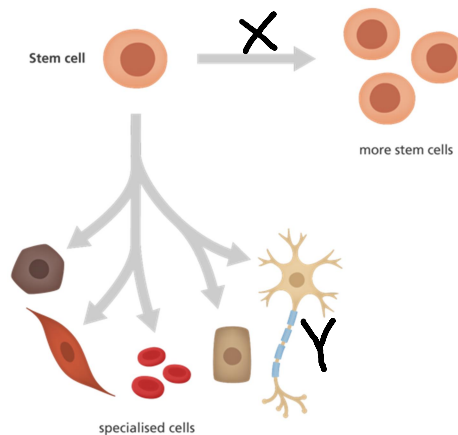
25. Drug development is an important part of developing modern day medicines for public consumption. Which part of the drug trial process involves the use of a placebo?

- A: Preclinical trials
- B: Phase 1 Clinical trials
- C: Phase 2: Clinical trials
- D Phase 3: Clinical trials

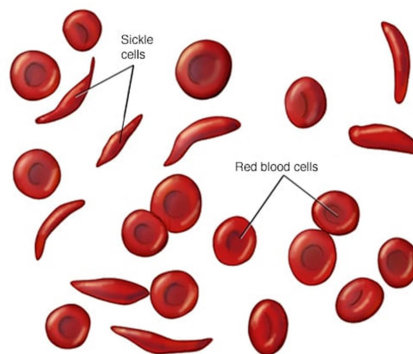
*End of MCQ [25 marks]*

## **Part 2: Extended Theory:**

1. Stem cells can be used in a wide variety of treatments to help patient with various diseases.



- 1a) Define what is meant by the term stem cell? [2 marks]
- b) State the process occurring on the arrow X? [1 mark]
- c) State the function of the specialised cell Y? [1 mark]
- d) Sickle cell anaemia is a condition that affects the red blood cells, it is a genetic condition that can be treating using stem cells.



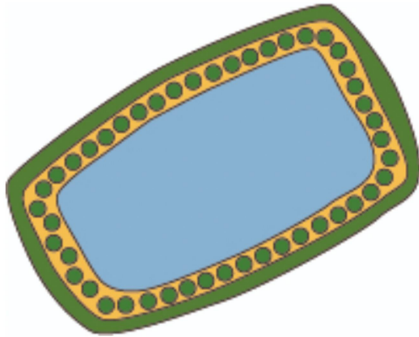
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- di) Describe 2 symptoms of sickle cell anaemia on patients? [1 mark]
- ii) Two students were researching the best method of treating sickle cell anaemia is stem cells.  
Student A suggested that using adult stem cells is best, whereas Student B suggested using embryonic stem cells is best.  
Evaluate these statements? [6 marks]

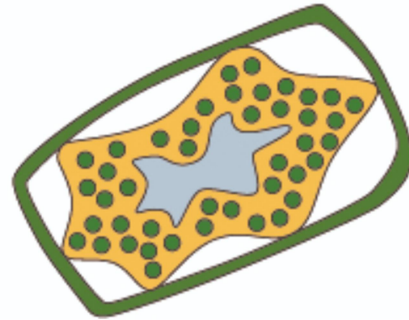
[Total marks 11]

2. The images below show cells of a typical plant cell, after it has been placing in unknown solutions.

**Diagram A**



**Diagram B**



- 2ai) What type of solution was the cell in diagram B placed in? [1 mark]
- aii) What is the correct name used to describe the cell shown in diagram B? [1 mark]
- aiii) Describe and explain the appearance of cell A? [4 marks]
- b) The above experiment was repeated using the same solutions, however, instead of plant cells red blood cells were used.
- Bi) Draw and label a red blood cell after being placed in the same solution as cell B? [2 marks]
- ii) Explain the differences in the appearance of the red blood cells compared to cell B? [2 marks]

[Total 10 marks]

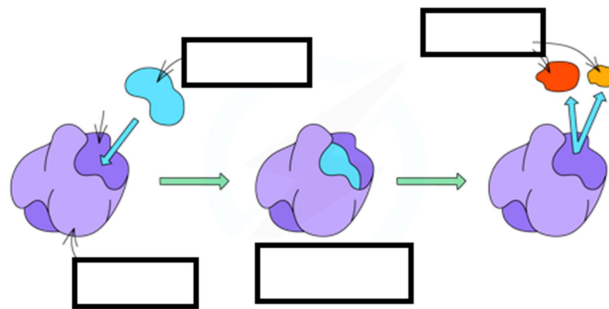
3. Proteases are enzyme involved in chemical digestion.

4.

a) Complete the table below regarding proteases: [2 marks]

Protease	Site of production	Site of digestion

b) Below is an image illustration enzyme reaction.



Bi) Label the missing information in the diagram? [2 marks]

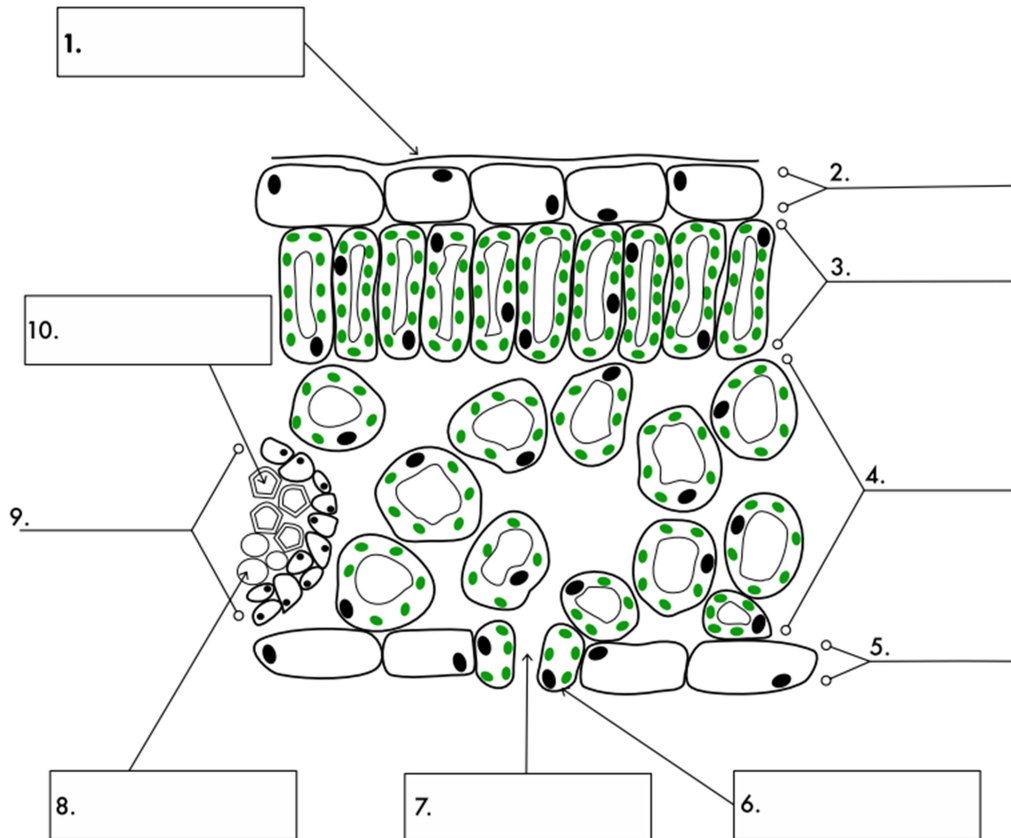
Bii) Describe and explain to the rate of protein digestion reaction when the temperature is decreased? [4 marks]

Biii) Describe a suitable method for observing the change of rate of protein digestion? [3 marks]

[Total marks 11]

5. Plants are autotrophic organisms; they can make their own food by the process of photosynthesis.

a) Write the balanced chemical equation for photosynthesis? [3 marks]



b) The image above is a cross section of a leaf

Bi) State two substances transported in vessel 8? [1 mark]

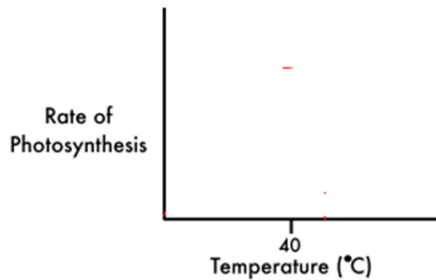
Bii) Describe the process that occurs at 7. [2 marks]

Biii) Identify layer 4, and describe how it is adapted to its function? [3 marks]

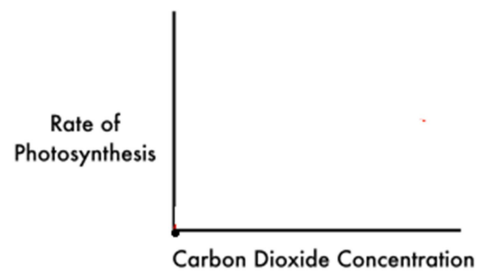
c) The rate of photosynthesis can be influenced by temperature, carbon dioxide and light intensity.

ci) Sketch the graphs for each of the factors mentioned, one has been completed for you. [1 marks]

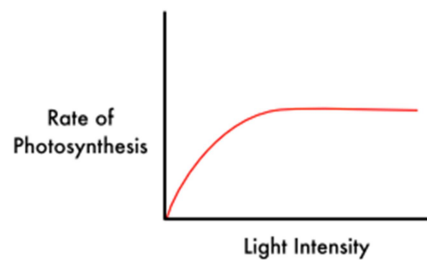
① **Temperature**



② **Carbon Dioxide**



③ **Light**



cii) Describe and explain the rate of photosynthesis for the factor light intensity as shown in graph 3? [3 marks]

[Total 13 marks]

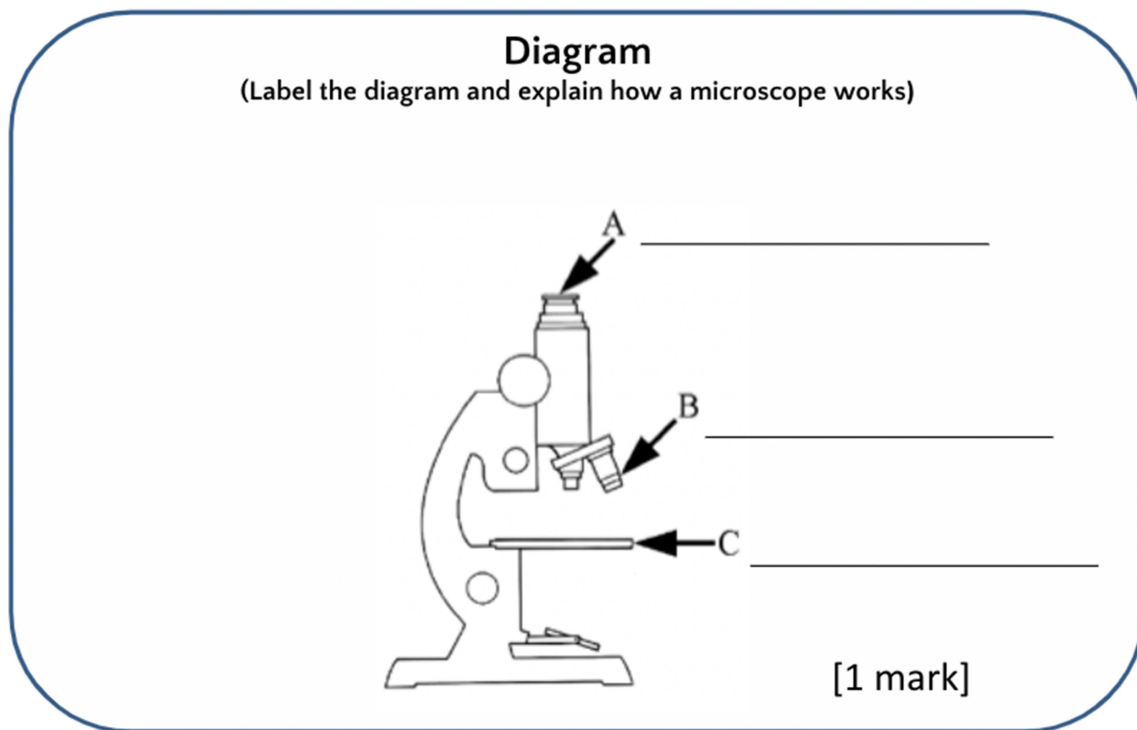
*End of Extended theory [45 marks]*



**Practical component:**

1. Microscopes are used to observe cells, during an investigation a student wishes to observe human cheek cells using a cotton swap to take a sample.

a) Complete the labelled diagram of the light microscope? [1 mark]

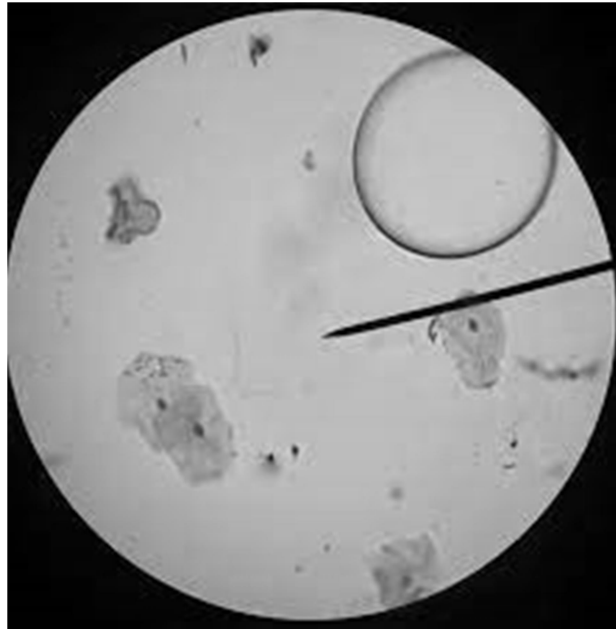


bi) State the chemical stain used to observe animal cells? [1 mark]

bii) Explain why a stain is needed to view the sample? [1 mark]

- c) Describe in detail the process of slide preparation, include the names of equipment and safety precautions you should take when preparing the sample? [6 marks]

d) Below is an image of the successful specimen.



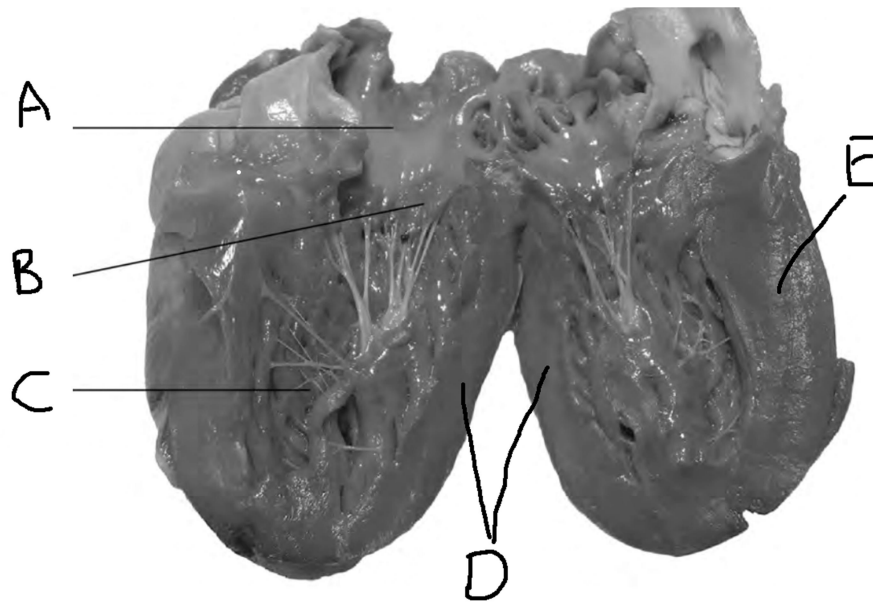
di) State the error the student has made their cell preparation? [1 mark]

dii) Suggest what the student can do to correct this mistake? [1 mark]

e) The actual diameter of cheek cells is  $38\mu\text{m}$ . A student was asked to draw an image with a magnification of  $\times 2500$ . Calculate the image diameter that should be drawn, select a suitable unit for your answer. [3 marks]

[Total 14 marks]

2) The heart is a major organ in the circulatory system, students carried out a dissection of the heart, the result is shown below.



(Image like this)

Ai) Label part B? [1 mark]

Aii) Describe the function of part D? [1 mark]

Aiii) Describe and explain the difference in appearance of part C, compared to part E? [2 marks]

b.) Dissections of biological material is a biohazard, another danger risk involves cuts from using a scalpel. Describe how to correctly use a scalpel during a dissection. [1 mark]

c) When exercising a person's heart rate will increase, suggest a suitable method than can be used to measure a person's heart rate? [3 marks]

d) Daphnia are small water shrimp where you can view their heart beating. A student investigated the effect of a drug on the heart rate of daphnia. The student repeated the experiment the results are in shown in table below.

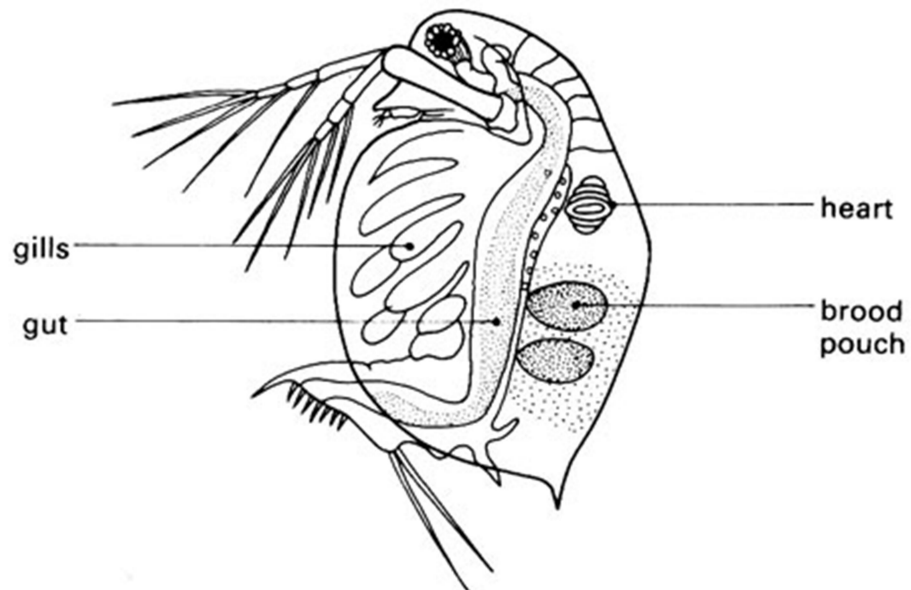
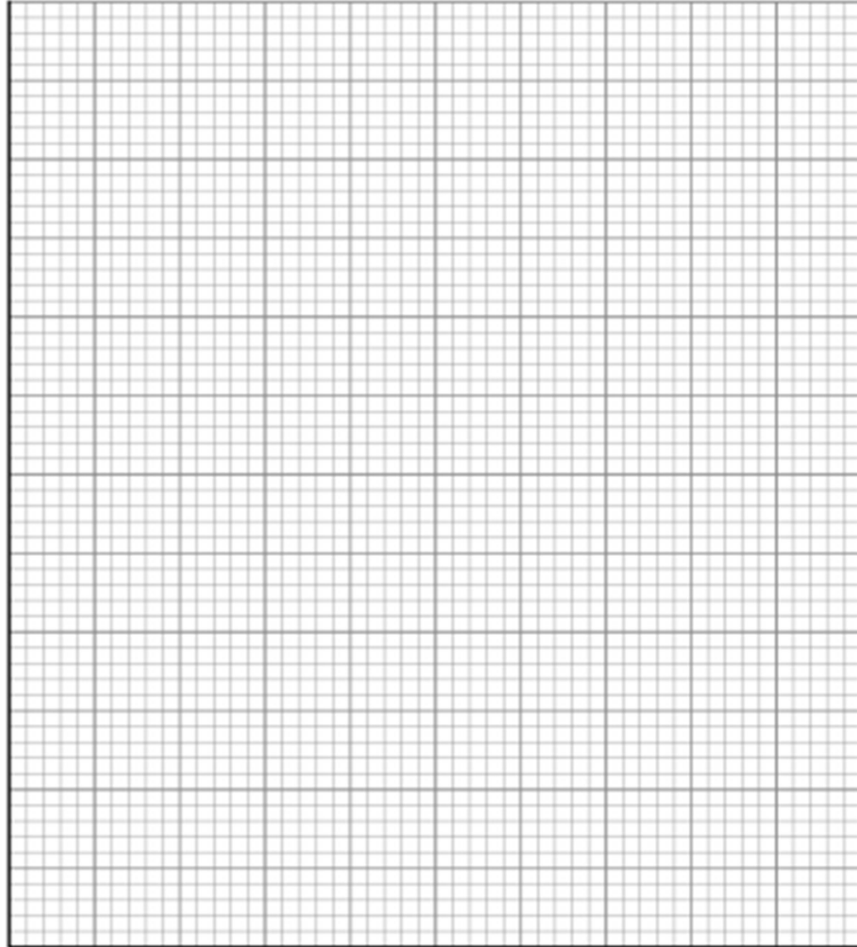


Image of Daphnia

Mean heart rate (arbitrary units)	Heart rate (arbitrary units)	Heart rate (arbitrary units)	Heart rate (arbitrary units)	Concentration of drug %
42.7	43	45	40	0
53	58	76	65	0.1
80	55	96	90	0.2
107.3	105	107	110	0.3
114.3	110	120	113	0.4
122	122	124	120	0.5

di) State the mistakes the student has made in recording their results? [3 marks]

dii) Draw a graph in the space below to represent the effect of drug concentration on heart rate? [5 marks]



(Grid needs to be able to have at least 11/12 vertical squares and at least 6 horizontal for grid)

*End of Practical component [30 marks]*