



**Answer ALL questions in the spaces provided**

*Leave blank*

1. The table below refers to features of prokaryotic and **eukaryotic** cells. If the feature is usually present, place a tick (✓) in the appropriate box and if the feature is absent, place a cross (✗) in the appropriate **box**.

Feature	Prokaryotic cell	Eukaryotic cell
Cell surface membrane		
Plasmids		
Ribosomes		
Mitochondria		

**Q1**

**(Total 4 marks)**

2. Read through the following passage about protein structure, then write on the dotted lines the most appropriate word or words to complete the passage.

Proteins are composed of long chains of monomers called ....., which are linked together by ..... bonds. These bonds are formed by ..... reactions between adjacent monomers. The primary structure of a protein is the specific sequence of monomers in a **polypeptide** chain and determines the secondary and tertiary protein structure. The secondary structure of a protein may be a coil, known as an ....., which is held in shape by ..... bonds between different monomers in the chain.

**Q2**

**(Total 5 marks)**

3. (a) Explain what is meant by the term diffusion.

.....  
.....  
.....  
.....

(2)

(b) State two factors which influence the rate of diffusion across a cell surface membrane.

1 .....

2 .....

(2)

(c) Give one way in which active transport differs from diffusion.

.....  
.....

(1)

(Total 5 marks)

*Leave  
blank*

**Q3**

--

4. Describe the role of messenger RNA (mRNA) in the following processes.

*Leave  
blank*

(a) Transcription

.....  
.....  
.....  
.....  
.....  
.....

(3)

(b) Translation

.....  
.....  
.....  
.....  
.....  
.....

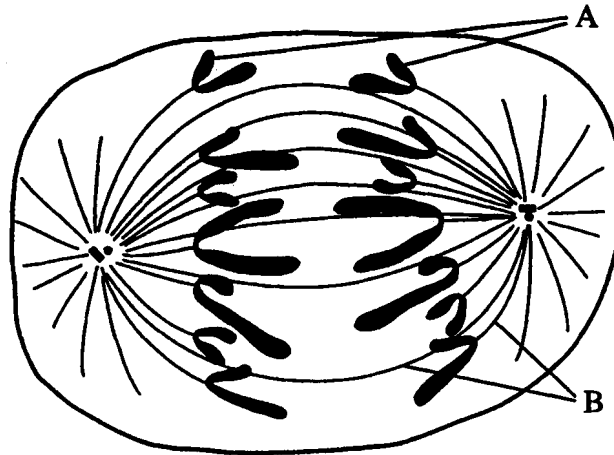
(3)

Q4

(Total 6 marks)

5. The drawing below shows an animal cell, magnified  $\times 1000$ , undergoing mitosis.

*Leave blank*



(a) Give two features that help to identify this as an animal cell.

1 .....

2 .....

(2)

(b) Name the parts labelled A and B.

A .....

B .....

(2)

(c) Name the stage of mitosis shown in the drawing.

.....

(1)

(d) Calculate the **actual** maximum diameter of this cell. Show your working.

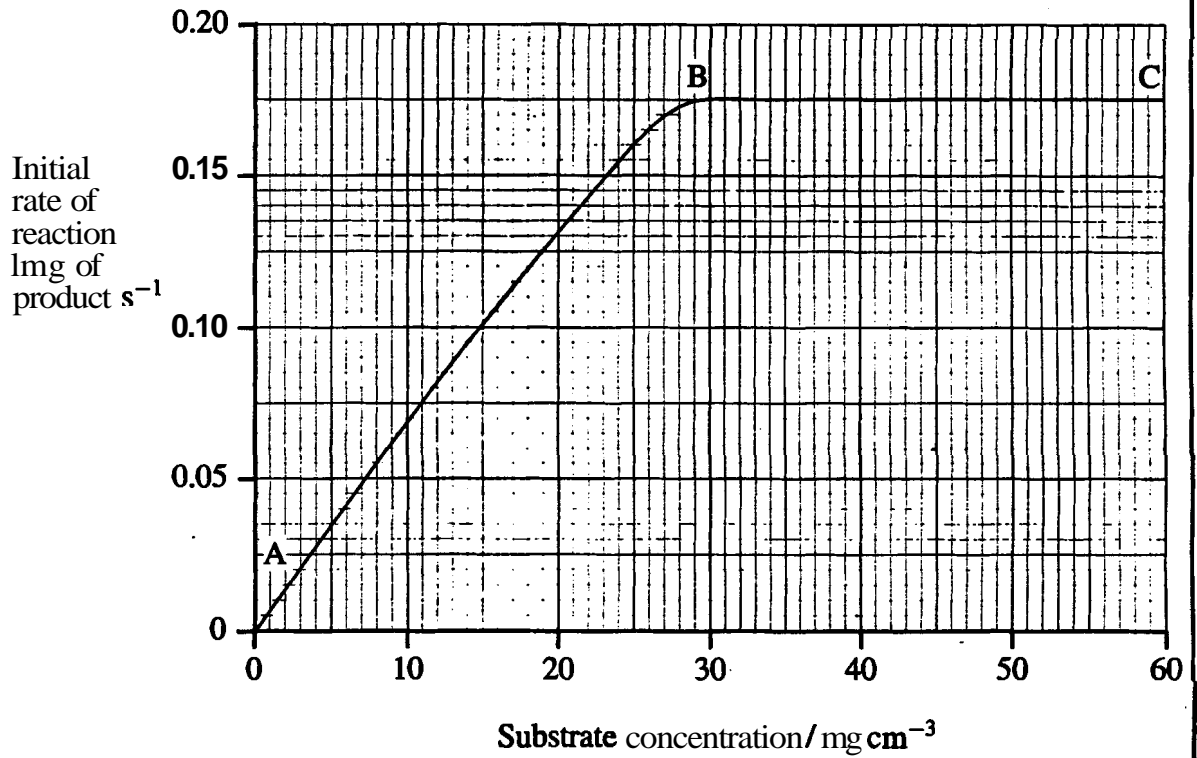
Answer .....

(2)

Q5

(Total 7 marks)

6. The graph below shows the results of an investigation into the effect of substrate concentration on the initial rate of an enzyme-controlled reaction.



(a) Suggest two conditions, apart from temperature, that should be kept constant in this investigation.

1 .....

2 .....

(2)

(b) Explain why changes in the substrate concentration cause an increase in the rate of reaction between points A and B on the graph.

.....

.....

.....

.....

(2)

(c) Suggest why the curve levels off between points B and C.

*Leave blank*

.....  
.....  
.....  
.....

(2)

(d) On the graph on page 6, sketch a curve to show how the results for the investigation would change if it were repeated at a lower temperature.

Explain any differences between the two curves.

.....  
.....  
.....  
.....

(3)

Q6

(Total 9 marks)

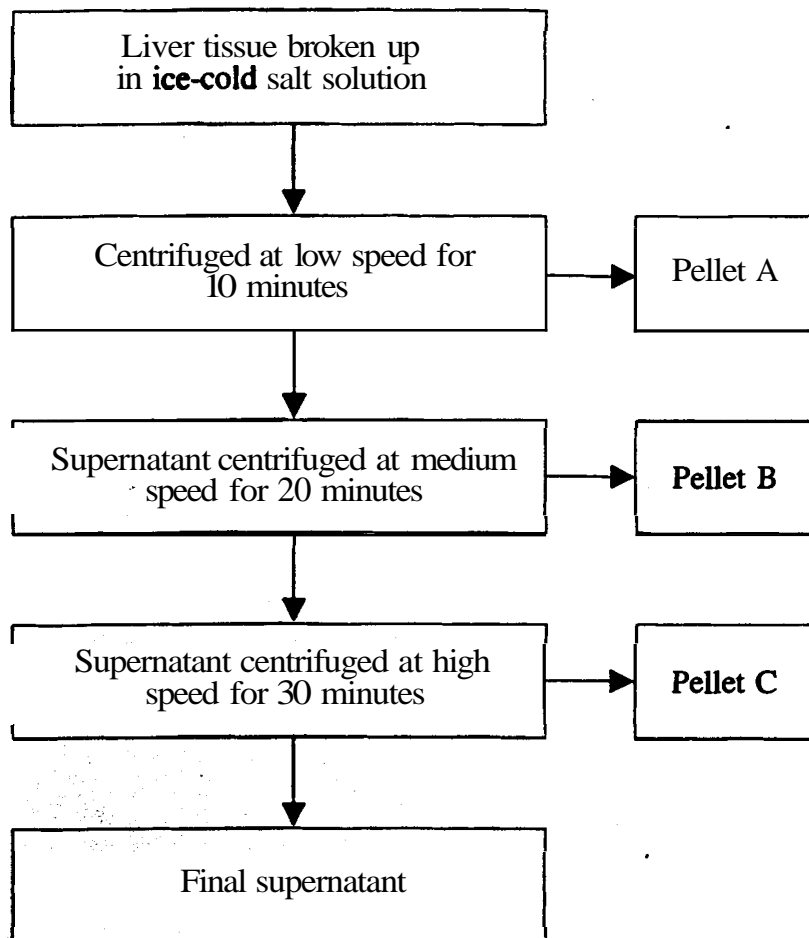
--

7. A procedure was carried out to **separate the major organelles within** liver cells. This involved **breaking up** (homogenising) liver tissue in an **ice-cold** salt solution which had the same water potential as the cell cytoplasm.

Leav  
blank

**Ultracentrifugation** was then used to separate the organelles. Ultracentrifugation is a process that separates materials of different densities by spinning them in a tube at different speeds. The denser materials are **forced** to the bottom of the tube as a pellet, while less dense materials remain nearer to the top of the tube in liquid known as the supernatant.

The flow chart below summarises the steps involved in this procedure.



- (a) Suggest why it was necessary for the salt solution to have the same water potential as the cell cytoplasm.

.....

.....

.....

.....

(2)



*Leave blank*

- (b) This procedure separated **mitochondria**, nuclei and **ribosomes** into the three pellets, A, B and C. Complete the table below to show which one of these **organelles** would be found in which pellet.

Pellet	Organelle
A	
B	
C	

(2)

- (c) Suggest two components of the **cell**, other than water, that might be present in the final **supernatant**.

1 .....

2 .....

(2)

- (d) In the space below, draw and label a diagram to show the structure of a **mitochondrion**.

(4)

**BLANK PAGE**

(e) Explain why large numbers of mitochondria are found in liver cells.

*Leave blank*

.....

.....

.....

.....

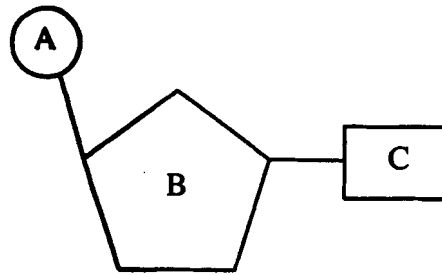
(2)

Q7

(Total 12 marks)

--	--

8. The diagram below shows the structure of a nucleotide.



(a) Identify the parts labelled A, B and C in the diagram.

A .....

B .....

C .....

(3)

(b) The sequence of bases from part of a gene is shown below.

A G C C G T C C C G T C

Write out the sequence of bases on messenger RNA (mRNA) that would be coded for by this part of the gene.

.....

(2)

(c) Describe what is meant by the semi-conservative replication of DNA.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

(4)

(d) A quantity of DNA was labelled with radioactive nitrogen. It was then allowed to replicate three times, using non-radioactive nucleotides to synthesise the new DNA strands. What proportion of the final mass of DNA would you expect to be radioactive? Explain your answer.

*Leave blank*

.....  
.....  
.....  
.....

(2)

(e) In which stage of the cell cycle does replication of DNA take place?

.....

(1)

Q8

(Total 12 marks)

--	--

9. Give an account of the structure and functions of the cell surface membrane.

*Leave  
blank*

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

*Leave  
blank*

A series of horizontal dotted lines for writing, spanning most of the page width.

Leave  
blank

[This area contains 25 horizontal dotted lines for writing answers.]

Q9

(Total 10 marks)

--	--

**TOTAL FOR PAPER: 70 MARKS**

**END**