

Answer ALL questions in the spaces provided.

Leave blank

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

Enzymes can be described as biologicalas they reduce the needed for a metabolic reaction to occur.

The combines with the enzyme at a specific region of the molecule called the The shape of this region can be altered by a change in pH or which will

..... the rate of the metabolic reaction.

Q1

(Total 6 marks)

2. (a) State **two structural** differences between the molecules of the polysaccharides cellulose and glycogen.

	Cellulose	Glycogen
1		
2		

(2)

- (b) State **two structural** differences between the molecules of the proteins collagen and insulin.

	Collagen	Insulin
1		
2		

(2)

(Total 4 marks)

Q2

3. (a) A student was given two carbohydrate solutions, labelled A and B, and was told to perform two tests on each solution.

Leave blank

Test 1: Add Benedict's solution and heat.

Test 2: Add hydrochloric acid and boil.
Neutralise with alkali.
Add Benedict's solution and heat.

The table below shows the colour of each solution after testing.

Solution	Colour after Test 1	Colour after Test 2
A	Red	
B	Blue	Red

- (i) Complete the table to show what colour solution A would be following Test 2. (1)

- (ii) Explain why these results indicate that solution B contained a non-reducing sugar.

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(2)

- (b) Describe how you would use biuret reagent to compare the concentration of proteins in two solutions.

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(3)

Q3

(Total 6 marks)

4. The table below refers to the formula and structure of some biological molecules.

Leave blank

Complete the table by writing in the name, the formula or the structure of the molecule where appropriate in the empty boxes.

Name	Formula	Structure
Water	H ₂ O	
	NH ₂ RCHCOOH	
Fatty acid		$ \begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{O} \\ & & & & & & // \\ \text{H} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & \\ & & & & & & \backslash \\ & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{OH} \end{array} $
		$ \begin{array}{c} \text{CH}_2\text{OH} \\ \\ \text{C} - \text{O} - \text{C} \\ / \quad \backslash \quad / \quad \backslash \\ \text{H} \quad \text{C} \quad \text{H} \quad \text{C} \quad \text{H} \\ \quad \quad \quad \\ \text{HO} \quad \text{OH} \quad \text{H} \quad \text{OH} \\ \quad \\ \text{C} \quad \text{C} \\ \quad \\ \text{H} \quad \text{OH} \end{array} $

(Total 6 marks)

Q4

5. Immobilised enzymes have a wide range of commercial applications.

Leave blank

(a) Explain what is meant by the term **enzyme immobilisation**.

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(2)

(b) Explain **two** advantages of using immobilised enzymes in industrial processes.

1.

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2.

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(4)

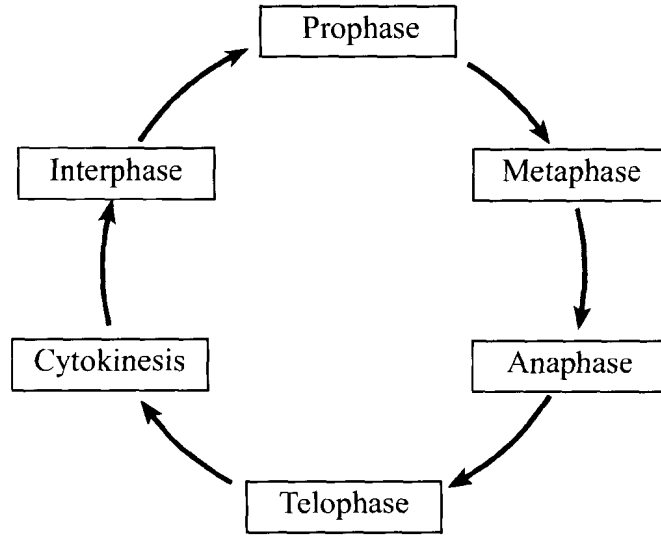
Q5

(Total 6 marks)

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6. The diagram below shows the sequence of stages in the cell cycle.

Leave blank



(a) During the cell cycle, the DNA content of the cell changes. Identify the stage when the DNA content increases and the stage when the DNA content decreases. In each case give an explanation for your answer.

DNA increases

Explanation

.....

DNA decreases

Explanation

.....

(4)

(b) Proteins are synthesised during interphase of the cell cycle. Protein synthesis involves transcription and translation of the genetic code.

Leave blank

(i) Explain what is meant by the term **transcription**.

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.....

(2)

(ii) The letters below show the sequence of bases in part of a gene which codes for an enzyme.

ATGGAAAAAGC

Use the information in the table below to work out the sequence of amino acids which is coded for by this part of the gene. The names of the amino acids are shortened to their first three letters. You do not need to write down the full names of the amino acids.

		Second base					
		A	G	T	C		
First base	A	AAG } AAT } AAC } Leu	AGA } AGC } AGT } Ser AGC	ATA } Tyr ATG } ATT } STOP ATC }	ACA } Cys ACG } ACT } STOP ACC } Trp	A T C	Third base
	G	GAA } GAG } GAT } GAC } Leu	GGA } GGC } Pro	GTG } His GTT } Gln GTC }	GCT } Arg GCC }	A G T C	

Sequence of amino acids

(2)

Q6

(Total 8 marks)

7. The photograph shows a cell in mitosis as viewed using a transmission electron microscope.

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Dr D. Spector, Peter Arnold Inc./ Science Photo Library

- (a) The actual diameter of the cell between points X and Y is 50 μm . Calculate the magnification of this photograph. Show your working.

Answer

(3)

- (b) In the space below make an accurate drawing of the cell. Label the chromosomes, spindle fibres and centrioles.

(5)

(c) State the stage of mitosis that this cell is in.

.....

(1)

(d) State **one** function of each of the following.

Spindle fibres

.....

.....

Centrioles

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(2)

*Leave
blank*

Q7

(Total 11 marks)

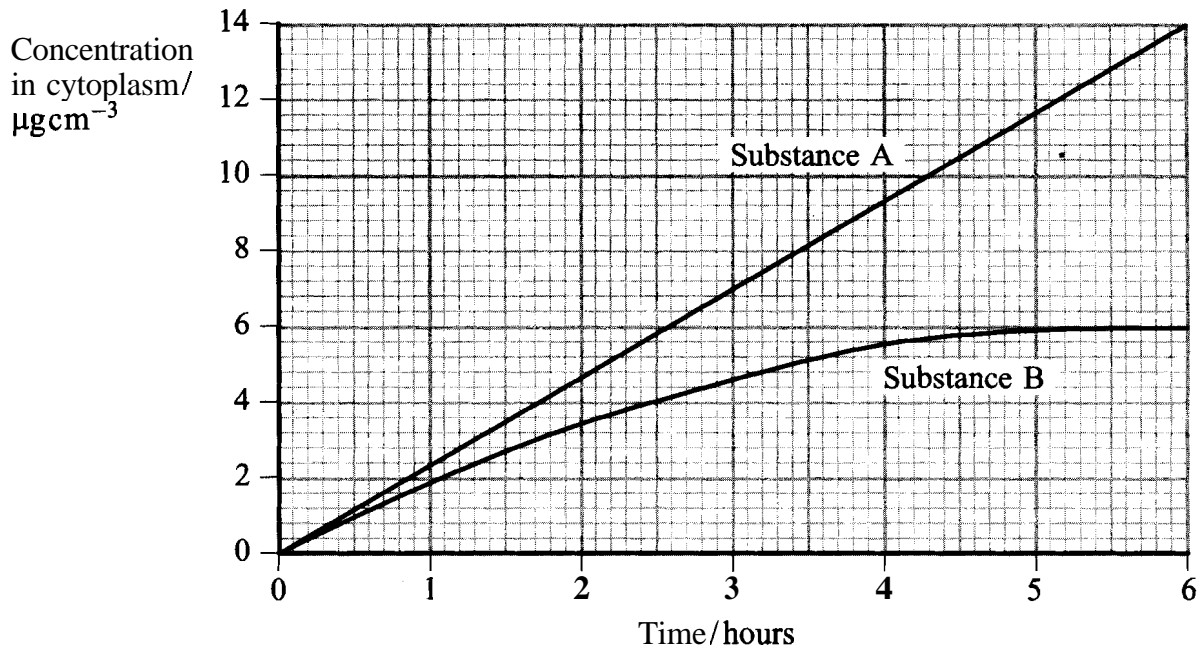
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8. An experiment was carried out to compare the uptake of two substances, A and B, by *Amoeba*. *Amoeba* is a single-celled aquatic organism.

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Cells of *Amoeba* were placed in a solution containing equal concentrations of both substances and kept at 15°C. The concentration of each substance in the cytoplasm of the cells was measured every 30 minutes over a period of 6 hours.

The results of this experiment are shown in the graph below.



- (a) Compare the uptake of substance A by the cells with the uptake of substance B during the period of 6 hours.

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(3)

(b) Substance B enters the cells by diffusion. Describe and explain how the results of this experiment support this statement.

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(3)

(c) Explain why an increase in temperature to 25 °C would increase the rate of diffusion of substance B into the cells.

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(2)

Question 8 continues overleaf

(d) Substance **A** is taken into *Amoeba* by active transport. Describe the process of active transport.

Leave blank

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(5)

Q8

(Total 13 marks)

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TOTAL FOR PAPER: 60 MARKS

END