

Answer ALL questions in the spaces provided.

1. The table below refers to four processes by which molecules can cross a cell surface (plasma) membrane. If the statement is correct, place a tick (✓) in the appropriate box and if the statement is incorrect, place a cross (✗) in the appropriate box.

Process	Requires carrier proteins	Requires energy in the form of ATP
Simple diffusion		
Facilitated diffusion		
Osmosis		
Active transport		

Q1

(Total 4 marks)

2. Read through the following account on lipids, then write on the dotted lines the most appropriate word or words to complete the account.

Lipids are insoluble in water because they are

A triglyceride is one type of lipid. A triglyceride consists of one

..... molecule with three

molecules joined to it by bonds. Triglycerides

have important roles in living organisms, including waterproofing and

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Q2

(Total 5 marks)



3. The table below refers to some cell structures. Complete the table by inserting the correct word, words or diagram in the appropriate boxes. Leave the shaded grey boxes empty.

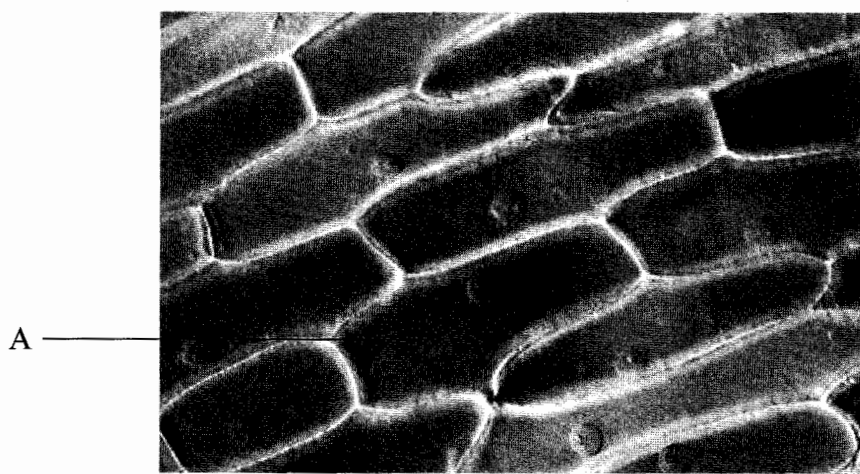
Name of cell structure	Description of cell structure	Diagram of cell structure
	1. Darkly-stained region in the nucleus. 2. Where ribosomal RNA is made.	
(1)		
Centriole		(2)
Lysosome	1. 2.	
(2)		
	1. Hollow cylinders made of protein. 2. Form spindle fibres.	
(1)		

(Total 6 marks)

Q3



4. The photograph below shows some onion cells as seen using the high power of a light microscope.

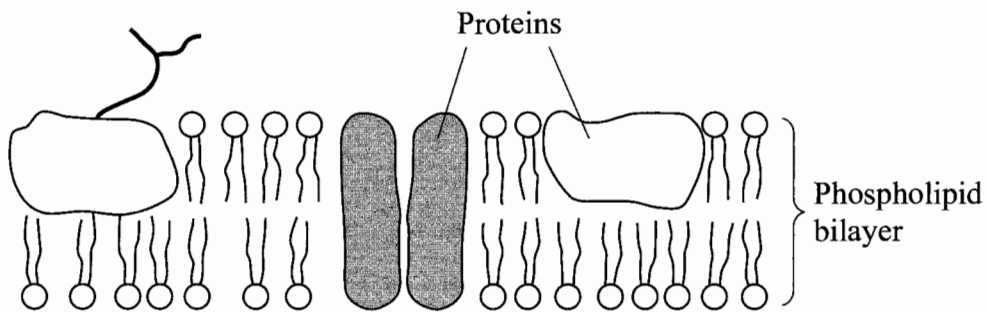


(a) In the space below, make an accurate drawing, enlarged $\times 2$, of the cell labelled A. Do **not** label your drawing.

(3)



(b) All the onion cells have a cell surface (plasma) membrane. The diagram below shows the structure of this membrane.



Explain how the properties of phospholipids result in the formation of a bilayer.

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(3)

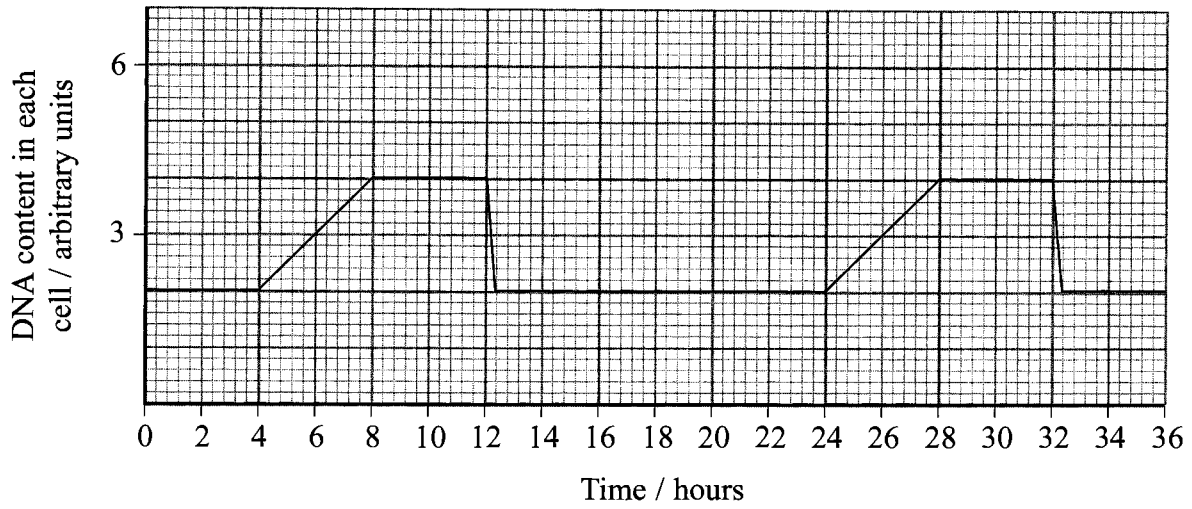
(Total 6 marks)

Q4

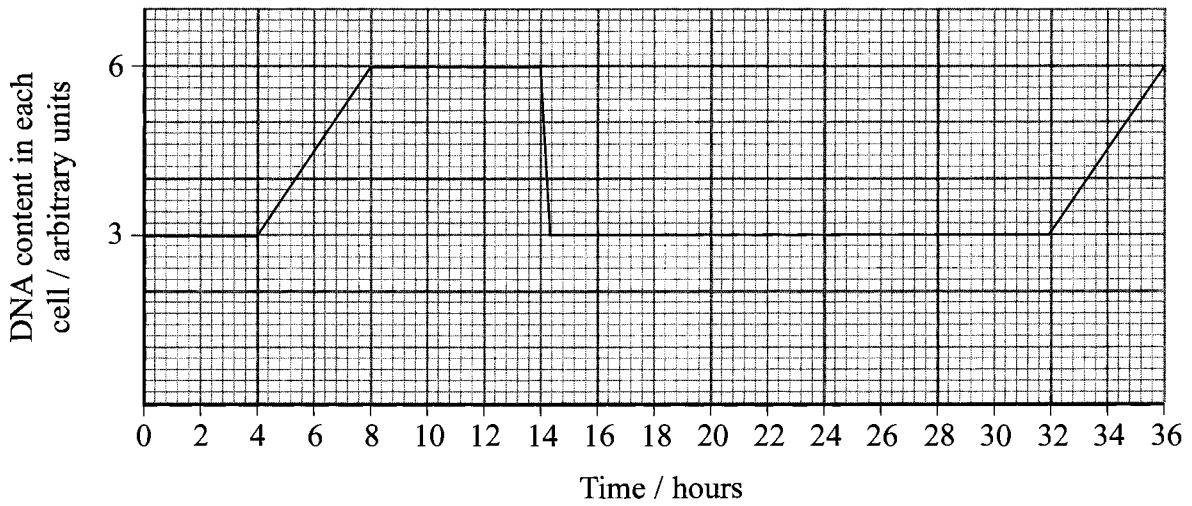


5. The graphs below show changes in the DNA content of cells during the cell cycle in two different plants, A and B.

Plant A



Plant B



(a) Compare the cell cycle of plant A with the cell cycle of plant B.

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(3)



(b) The DNA content of the cells of plant A doubles between 4 and 8 hours. Give an explanation for this change in DNA content.

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(2)

(c) Describe the events that are occurring inside the cells of plant A between 11 and 13 hours.

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(2)

(Total 7 marks)

Q5



6. (a) A student tested separate samples of solutions A and B with Benedict's reagent, biuret reagent and iodine solution. A third solution (solution C) was tested with Benedict's reagent only.

The colours obtained after each test are shown in the table below.

Solution	Colour of sample after testing with		
	Benedict's reagent	Biuret reagent	Iodine solution
A	Blue	Blue	Blue-black
B	Brick red	Blue	Orange
C	Green	Not tested	Not tested

- (i) State the conclusions that the student can make about the contents of solutions A and B, using information from **all three** tests.

Solution A

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Solution B

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(2)

- (ii) A fresh sample of solution A was boiled with dilute acid, neutralised and then heated with Benedict's reagent. A brick red colour was obtained. Give an explanation for this result.

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(2)

- (iii) Suggest a reason why the result is brick red for solution B but green for solution C when tested with Benedict's reagent.

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(1)



(b) Describe how you would use biuret reagent to test two solutions of the same protein to find out which contains the higher concentration of protein.

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(3)

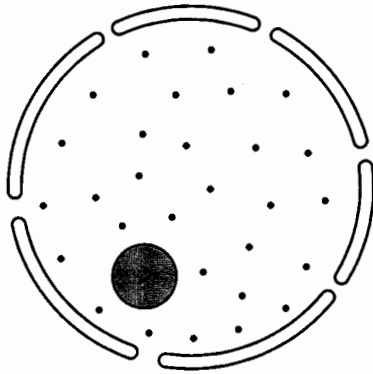
Q6

(Total 8 marks)

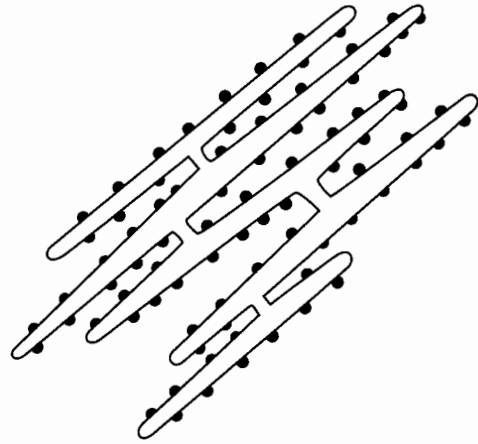


7. The diagram below shows some cell structures involved in protein synthesis in eukaryotic cells.

Nucleus



Rough endoplasmic reticulum



(a) Describe the events that occur inside the nucleus to produce a molecule of messenger RNA (mRNA).

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(4)

(b) Describe the role of the ribosomes in protein synthesis.

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(3)

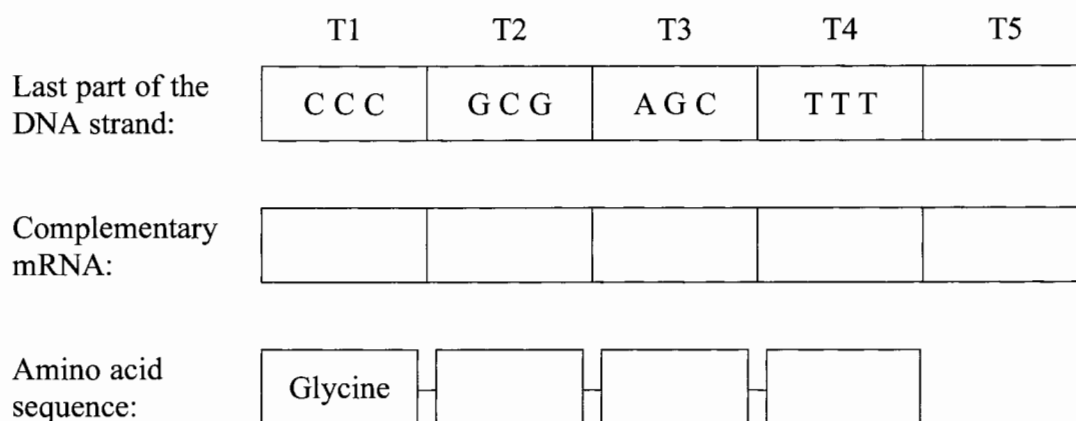


- (c) The table below gives some of the base triplets on DNA that code for some amino acids and stop signals.

Base triplet on DNA	Amino acid / stop signal
CCC	Glycine
AAA or AAG	Phenylalanine
AGA or AGC	Serine
GCG	Arginine
TTT	Lysine
ATT or ATC or ACT	Stop signal

The diagram below shows the five base triplets of a gene, labelled T1 to T5, and the complementary messenger RNA (mRNA).

The sequence of amino acids at the end of the protein produced is also shown.



- (i) Write in the codons found on the mRNA complementary to the base triplets T1, T2, T3 and T4 on the diagram above. (2)
- (ii) Using the information in the table, complete the amino acid sequence shown in the diagram above. The first one has been done for you. (2)
- (iii) Use the information in the table to suggest a base triplet for T5, on the DNA molecule.

..... (1)

(Total 12 marks)

Q7



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8. (a) Enzymes used in commercial processes are often in an immobilised form. The enzymes are attached to, or trapped in, an insoluble material.

(i) Explain **two** advantages of using **immobilised** enzymes in commercial processes.

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(4)

(ii) Describe the uses of immobilised lactase.

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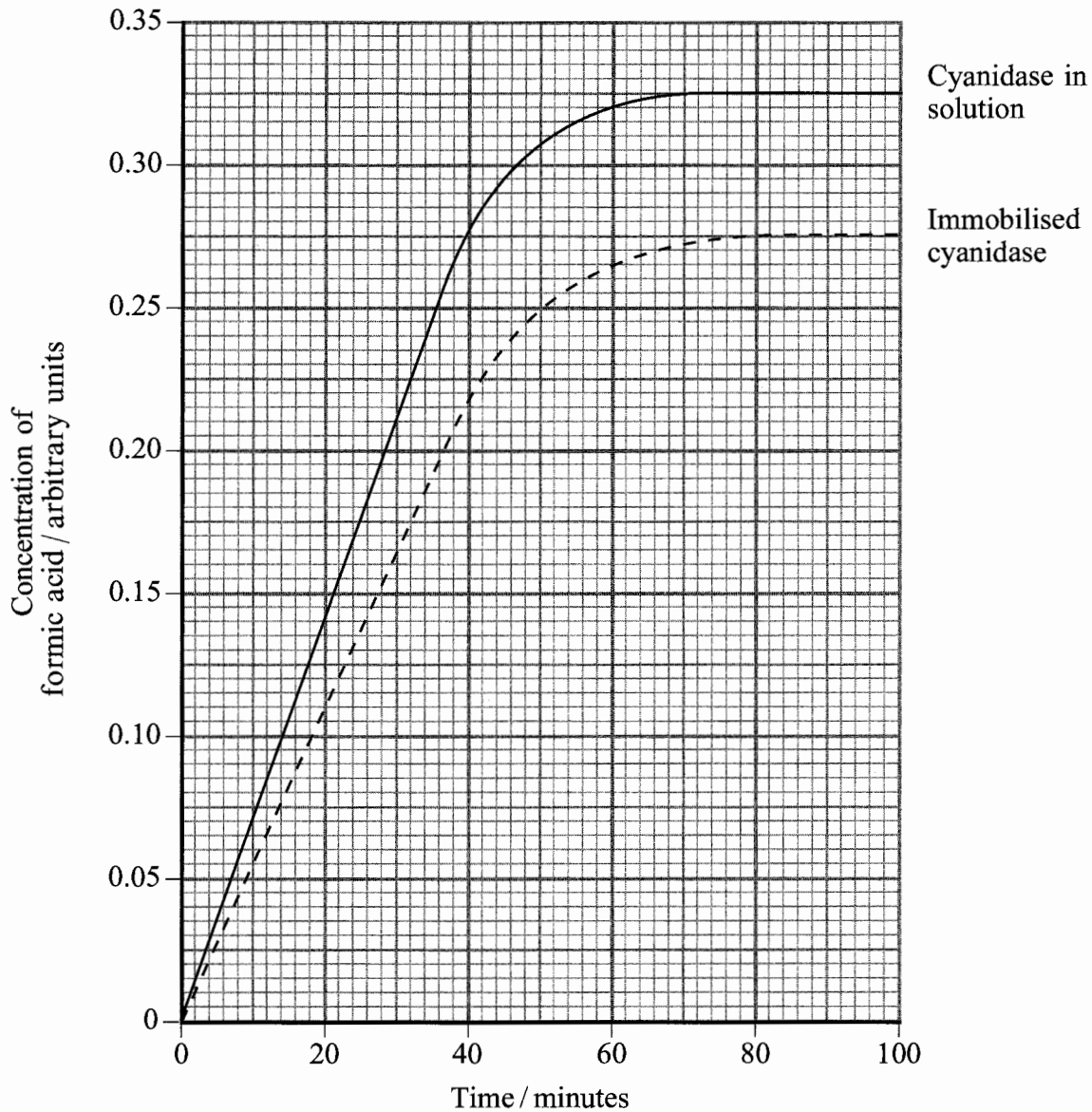
(3)



(b) Cyanide is a poison found in some industrial waste.

Cyanide can be removed from waste by using an enzyme called cyanidase which converts the cyanide into formic acid. The enzyme is usually used in an immobilised form by trapping it in a gel or in beads.

The graph below shows the results of measuring the production of formic acid using immobilised cyanidase and using cyanidase in solution (not immobilised).



(i) Describe the production of formic acid using cyanidase in solution.

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(3)

(ii) Suggest why the rate of reaction is lower when cyanidase is immobilised.

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(2)

(Total 12 marks)

Q8

TOTAL FOR PAPER: 60 MARKS

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