

Name: _____

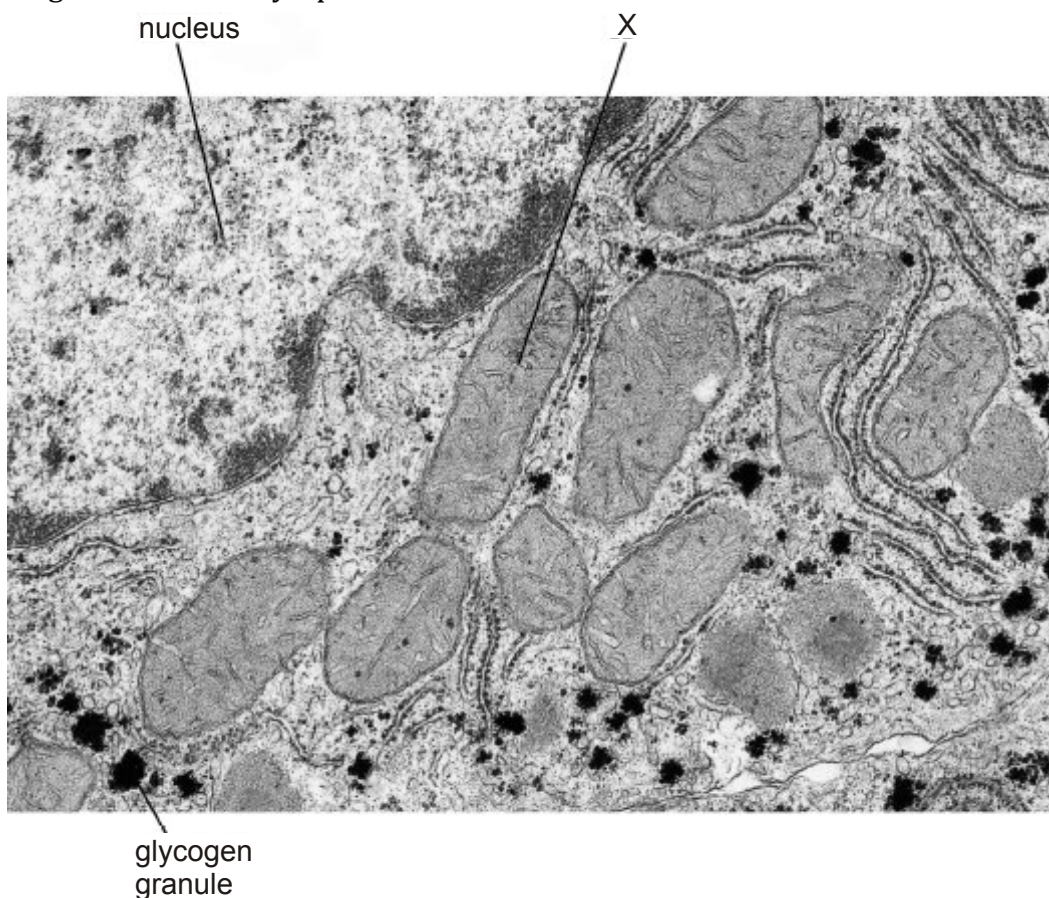
1. The table below compares features of typical eukaryotic and prokaryotic cells.
a) Complete the table by placing one of the following, as appropriate, in each empty box of the table.
-a tick (✓), -a cross (✗), -the words 'sometimes present'

Some of the boxes have been completed for you. [4]

	eukaryotic cell	prokaryotic cell
cell wall	sometimes present	✓
nuclear envelope	✓	
Golgi apparatus		✗
ribosomes		✓
flagellum	sometimes present	

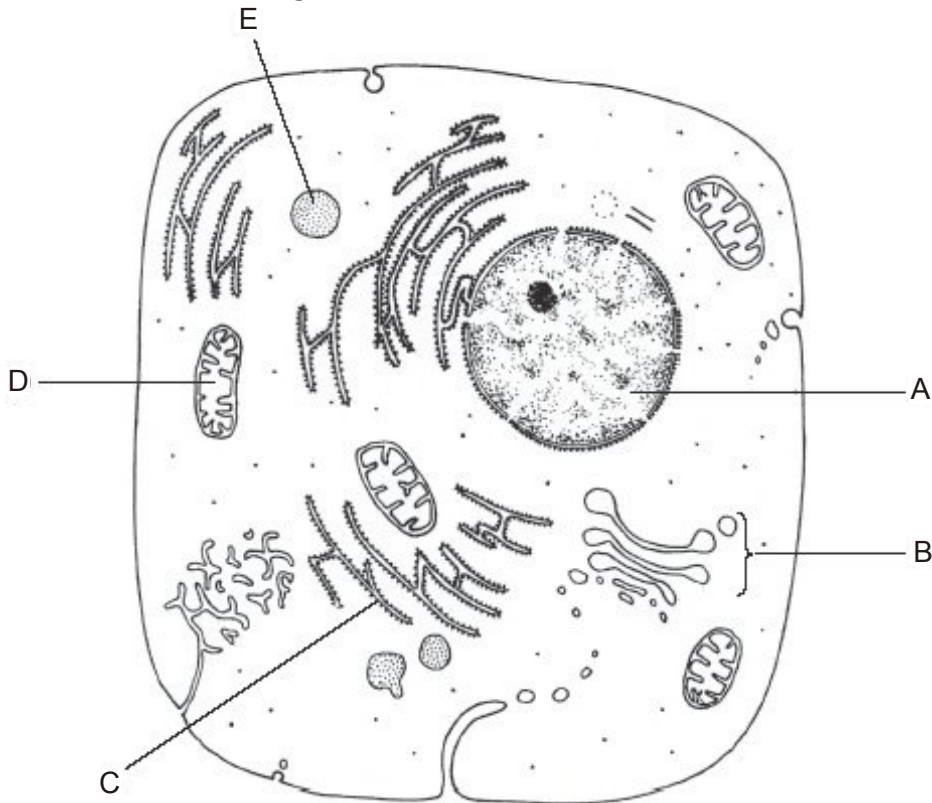
- b) Outline the roles of the Golgi apparatus and the ribosomes. [2]

2. The diagram below is an electron micrograph of part of a cell from a human liver. This cell is responsible for converting glucose in the body into glycogen for storage. The glycogen can be seen as granules in the cytoplasm.



- a) Identify the organelle labelled X in the diagram above. [1]
b) Suggest why liver cells of the type shown in the diagram contain many of these organelles. [1]

3. Below is a drawing of an animal cell as seen under an electron microscope.



Complete the following table by:

1) identifying the parts of the cell **A** to **E**

2) naming the part of the cell responsible for the function stated.

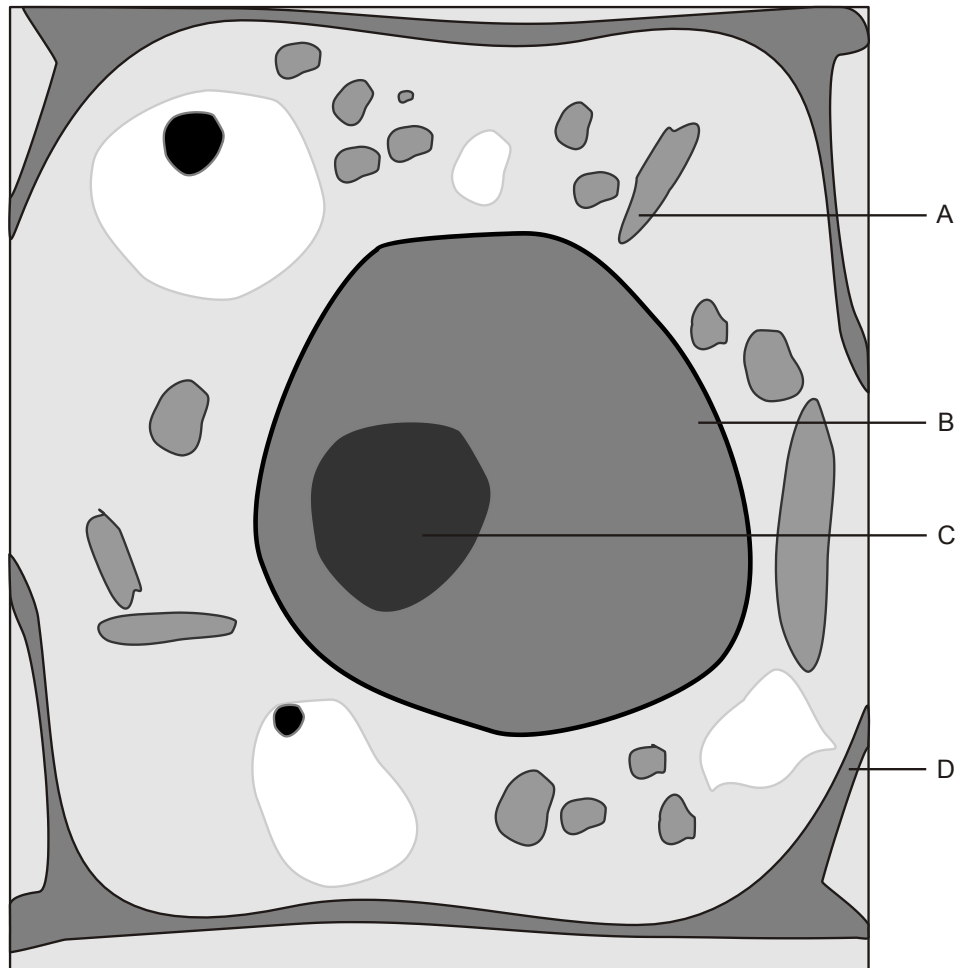
The first one has been done for you. [8]

function	part of cell	label
controls activities of the cell	<i>nucleus</i>	A
carries out aerobic respiration		
attaches to mRNA in protein synthesis		
produces secretory vesicles		
contains digestive enzymes		

4. The diagram below is of a plant cell.

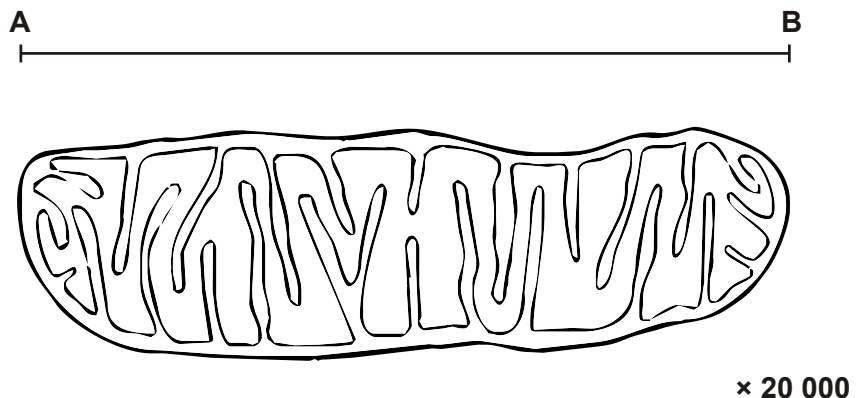
a. Name the parts of the cell labelled A to D. [4]

b. Ovary cells contain large amounts of endoplasmic reticulum (ER). Suggest the importance of this in using these cells for the production of a hormone. [2]



5. The diagram below is a drawing of an organelle from a ciliated cell as seen with an electron microscope.

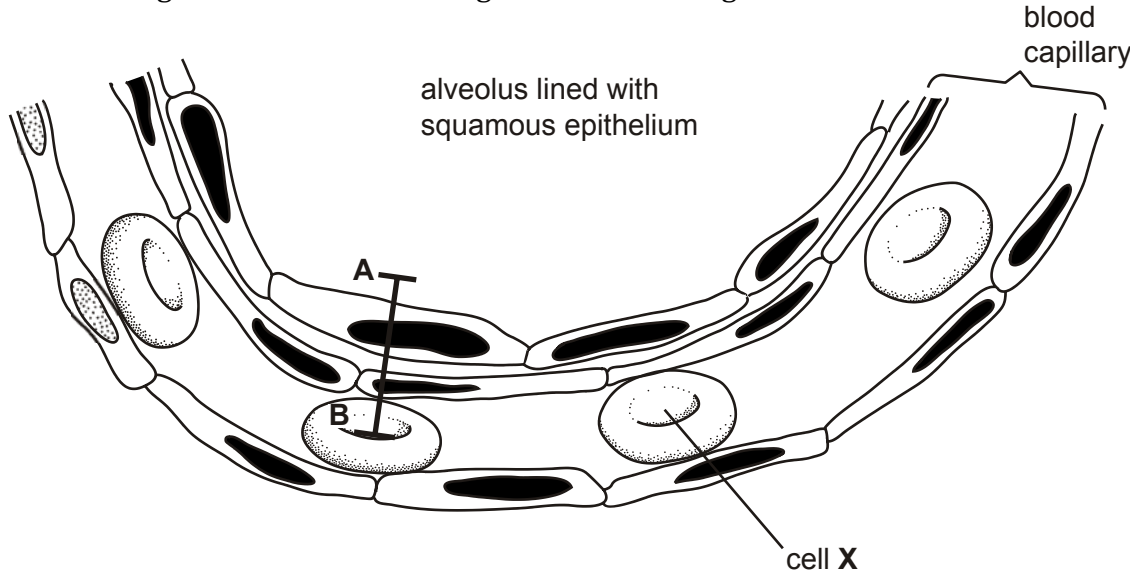
a) An image drawn to the same magnification as in the diagram could be produced using a light microscope. Explain why such an image would be of little use when studying cells. [2]



b) Name this organelle. [1]

c) State the word or phrase that best describes the ability of a microscope to distinguish between two separate points. [1]

6. The diagram below is a drawing of an alveolus together with an associated blood capillary.



- a) The line **AB** in the diagram represents an actual distance of $1.5 \mu\text{m}$. Calculate the magnification of the drawing. Show your working. [2]
- b) State a feature, **visible in the diagram**, which shows that squamous epithelial cells are eukaryotic. [1]
- c) State why squamous epithelium is described as a tissue. [1]
7. Mammals exchange respiratory gases via their lungs, whose surface area is greatly enlarged by the presence of many alveoli. Once in the red blood cells, the oxygen is picked up by haemoglobin.
- a. Explain how **two** features of red blood cells, **other than the presence of haemoglobin**, make them efficient in the collection of oxygen and its transport to the tissues. [4]
- b. In addition to the red blood cells, various types of white blood cell can be found in the blood system. Some of these white blood cells are lymphocytes. Describe **one** feature that would allow you to identify a white blood cell as a lymphocyte when viewed with a light microscope. [1]

Name: _____

1. The table below shows information about tests that identify three different types of biological molecule. Complete the table to show the names of the types of molecule that are tested, the reagents used and the results obtained. [5]

type of molecule tested	reagents used	positive result	negative result
protein			blue solution
	alcohol and water	white emulsion	clear liquid
starch			yellow solution

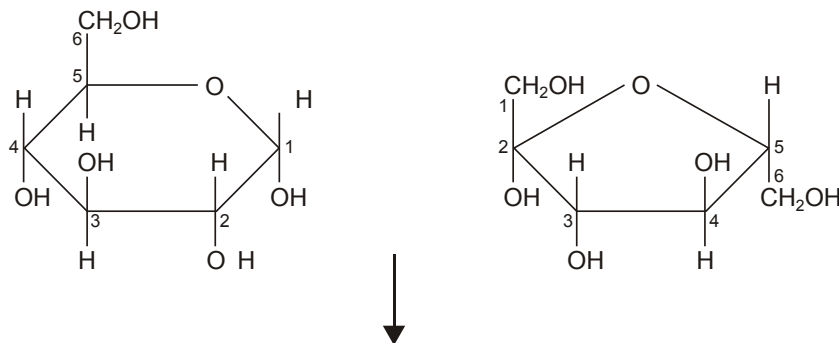
2. The table below shows six statements that apply to biochemical tests. Complete the table to show which of these statements apply to the biochemical tests carried out on the substances listed. Fill in each box using a tick (✓) to show that the statement applies or a cross (✗) if it does not. The first row has been completed for you. [4]

substance	statement					
	use heat	use biuret reagent	use Benedict's reagent	boil with a dilute acid	a positive result is a blue-black colour	a positive result is an emulsion
lipid	✗	✗	✗	✗	✗	✓
protein						
starch						
reducing sugar						
non-reducing sugar						

3. Maltose and sucrose are disaccharide sugars in which a bond joins two monosaccharide molecules. Sucrose is formed by the formation of a bond between carbon 1 of a glucose molecule and carbon 2 of a fructose molecule.

(i) Name the bond that joins the two molecules to form a disaccharide. [1]

(ii) Complete the diagram below to show what happens when the glucose and fructose molecules join together. [2]



Exam Review: Biological Molecules

4. Complete the following passage by inserting the most appropriate terms in the spaces provided.

Cellulose and collagen are both fibrous molecules. Cellulose, a carbohydrate, is the main component of the in plants.

Cellulose is made of chains of many glucose molecules which are joined by 1,4 bonds. Each glucose molecule is rotated° relative to its neighbour, resulting in a chain. Adjacent chains are held to one another by bonds. [5]

5. An experiment was carried out in which the enzyme lipase was used to hydrolyse a triglyceride. The pH of the reaction mixture was recorded at regular intervals during the experiment. The results are shown in the table.

time / min	pH
0	7.0
2	6.2
4	5.6
6	5.1
8	4.7
10	4.6
12	4.6
14	4.6

- (i) State what is meant by the term *hydrolysis*. [1]
- (ii) Explain why the pH falls during the reaction. [2]
- (iii) After 14 minutes, the mixture was analysed and unreacted triglyceride was found to be present. No inhibitor was added to the reaction mixture.

Explain why the reaction had stopped after 10 minutes. [2]

Describe how the **structure** of a phospholipid differs from that of a triglyceride. You may use the space below for a diagram to help your answer. [3]

Exam Review: Biological Molecules

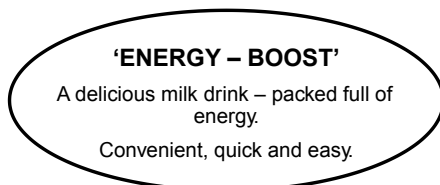
6. Complete the following passage by using the most suitable word(s) in each of the blank spaces. [6]

Water is essential for life. It makes up a high proportion of the cytoplasm in a cell. Many different compounds can dissolve in it and it is therefore described as an excellent
 Water remains in the state over a wide range of environmental temperatures. As it cools below 4 °C it becomes less than warmer water. Ice floats on water, forming a layer that the water beneath with the result that large bodies of water rarely freeze entirely. The bonds that form between water molecules are responsible for its high, which allows small insects such as pond skaters to move on its surface without sinking.

7. Complete the table below, comparing gum arabic with some other polysaccharides. [4]

	gum arabic	amylase	cellulose	glycogen
branched structure	yes		no	
heteropolysaccharide	yes		no	
found in animals/plants	plants		plants	
function in organism	healing cuts			energy store

8. 'Health – Milk' and 'Energy – Boost' are flavoured milk drinks. The manufacturers make the following claims:



The two different flavoured milk drinks and a sample of fresh milk were all tested for the presence of some biological molecules. The methods used and the results obtained are shown in the table below.

Exam Review: Biological Molecules

method used	colour change observed for		
	fresh milk	'Health – Milk'	'Energy – Boost'
a few drops of iodine solution added	remains yellow	remains yellow	remains yellow
5 cm ³ biuret solution added	blue to lilac	blue to lilac	blue to lilac
5 cm ³ Benedict's reagent added and solution boiled	blue to green	blue to green to yellow	blue to green to yellow to orange
<ul style="list-style-type: none"> • sample that has been tested with Benedict's reagent is filtered • the filtrate (solution) is boiled with 5 cm³ dilute acid, cooled and neutralised • then 5 cm³ Benedict's reagent is added and the solution is boiled 	remains blue	blue to green to yellow to orange	blue to green to yellow to orange to red

- (a) Using **only** the information in the table, state the biological molecules present in
- (i) fresh milk; [2]
- (ii) 'Health – Milk'. [3]
- (b) What **differences** between 'Health – Milk' and 'Energy – Boost' are identified by the information in the table? [2]
- (c) Explain why the claims made by the manufacturer for 'Health – Milk' could be misleading. [3]
- (d) Suggest why it would **not** be appropriate to test milk for lipids using the emulsion test. [1]

Name: _____

CELL DIVISION:

1. The haploid number of chromosomes for a human is 23.
 - a) State the number of chromosomes present in the nucleus of the liver cell. [1]

 - b) Name the type of nuclear division that produced this liver cell. [1]

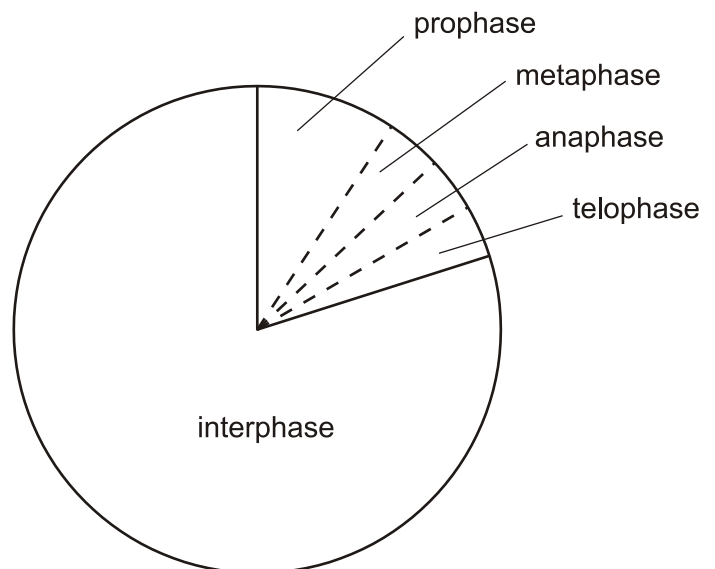
2. a) Name the stage of the mitotic cell cycle in which each of the following takes place: [7]
 - Chromosomes become visible as two chromatids
 - DNA replicates
 - Nuclear envelope reforms.
 - Chromosomes align at equator.
 - Chromatids move towards the poles.
 - Spindle microtubules shorten.
 - Chromosomes split at centromeres.

(b) During mitosis, chromosomes line up at the equator of the cell. Describe what happens to chromosomes after this, until the nuclear envelope reforms. [4]

3. Below is a diagram that shows the stages of the mitotic cell cycle.

a) Which processes must occur in a cell during interphase before mitosis can take place? [3]

b) Draw an arrow on the diagram to indicate the sequence in which the stages occur during the mitotic cell cycle. [1]



Exam Review: Cell Division & Genetic Control

4. Complete the following passage by inserting the most suitable terms in the blank spaces. [8]

Mitosis is a type of nuclear division and can be observed using a light microscope. In the first stage, known as, the chromosomes become visible. Each chromosome is seen as two chromatids joined at the

The nuclear breaks down, a spindle is formed and the line up at the equator. During the stage known as the chromatids separate, one of each pair moving to opposite of the spindle. Separate nuclei are formed. The cytoplasm is then shared between the daughter cells in a process known as These two cells are identical.

5. State **two** functions of mitosis. [2]

Genetic Control

1. DNA and RNA are nucleic acids.

- (i) Describe the structure of a DNA **nucleotide**. [3]

In your answer you should spell the names of the molecules correctly. You may use the space below to draw a diagram if it will help your description.

- (ii) Describe how the two nucleotide chains in DNA are bonded together. [4]

2. State **three** ways in which the structure of DNA differs from that of RNA. [3]

3. Deoxyribonucleic acid (DNA) is a polynucleotide.
- (i) State how many different types of nucleotide are found in DNA. [1]

 - (ii) Name the components of **one** of these nucleotides. [3]
4. State the word or phrase that best describes a length of DNA that codes for a particular polypeptide. [1]
5. An enzyme, such as amylase, has a specific 3-dimensional shape.
Explain how DNA structure determines the specific shape of enzymes. [4]
6. Cystic fibrosis (CF) in humans is caused by mutations of a gene coding for transmembrane protein (CFTR) which acts as an ion pump. A large number of different mutations of the gene have been found. Explain what is meant by a gene mutation. [2]

Rice plants may have, in addition to a main stem, a number of side shoots (tillers) growing from ground level. These tillers may also branch. The ability to grow tillers is controlled by a single gene with two alleles, **T/t**. Plants with the genotype **tt** have a single grain-bearing stem and no tillers.

Allele **T** codes for a protein which regulates transcription. Expression of allele **T** allows stimulation of mitosis in the buds which become tillers.

Allele **t** has a 'stop' triplet within its DNA sequence as well as at its end.

- (i) State what is meant by a 'stop' triplet. [2]

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.....

.....

[2]

- (ii) Describe the effect of the 'stop' triplet **within** the DNA sequence of allele **t**. [3]

CHALLENGE:

Liver cells damaged by hepatitis infection switch on a gene called Fas, which causes them to self-destruct. Pioneering research has produced a strikingly successful treatment for hepatitis in mice. The Fas gene was silenced by the technique of RNA interference.

RNA molecules, 21 to 23 nucleotides long, were injected into mice with hepatitis. The sequence of this 'small interfering RNA' (siRNA) matched part of the Fas gene. Once in the liver cell the two strands of the siRNA were separated so that one strand could bind to the mRNA transcript of the Fas gene. This caused the mRNA to be destroyed by enzymes, therefore preventing the gene product from being made.

This therapy prevented liver cell death and considerably increased the survival of mice with hepatitis.

- (a) (i) Describe a way in which the **function** of mRNA differs from that of DNA.

.....
.....

[2]

- (ii) Describe **two** ways in which the **structure** of siRNA differs from mRNA.

1

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2

.....

[2]