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BIOLOGY

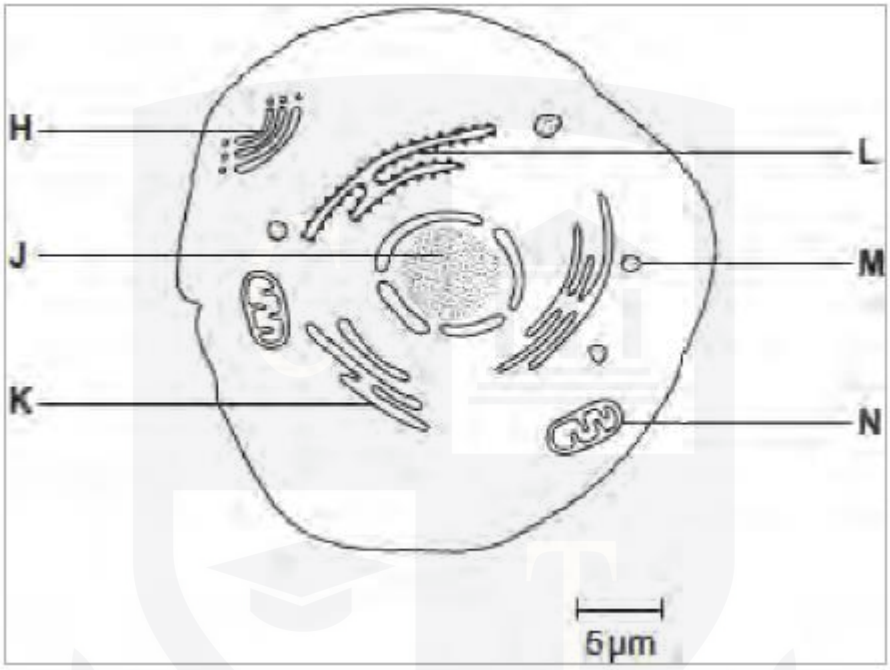
FOUNDATIONS IN BIOLOGY

Level & Board	OCR (A-LEVEL)
TOPIC:	CELL STRUCTURE
PAPER TYPE:	QUESTION PAPER - 3
TOTAL QUESTIONS	6
TOTAL MARKS	/44

Cell Structure - 3

1.

A eukaryotic cell is depicted in the diagram.



(a) Finish the table by adding the label for the organelle that corresponds with its function. **(3)**

Function of organelle	Letter
Protein synthesis	
Modifies protein (for example, adds carbohydrate to protein)	
Aerobic respiration	

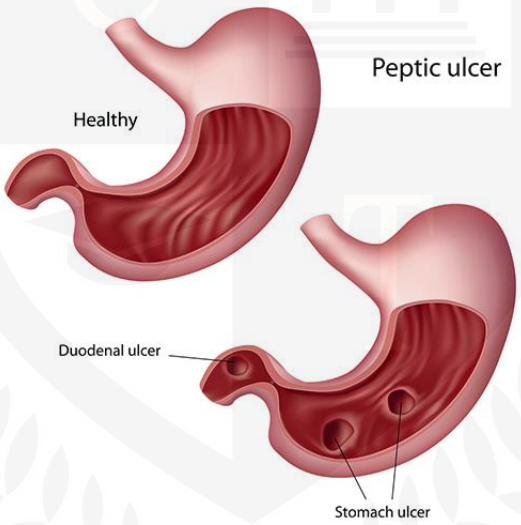
(b) Determine the drawing magnification by using the scale bar in the above diagram.

Display your work. **(2)**

Answer = ...

2.

Damage to the stomach lining cells results in an ulcer in the stomach. Helicobacter pylori is a common bacteria found in the stomachs of people who have stomach ulcers.



One group of scientists was interested in figuring out how stomach ulcers are caused by H. pylori infection.

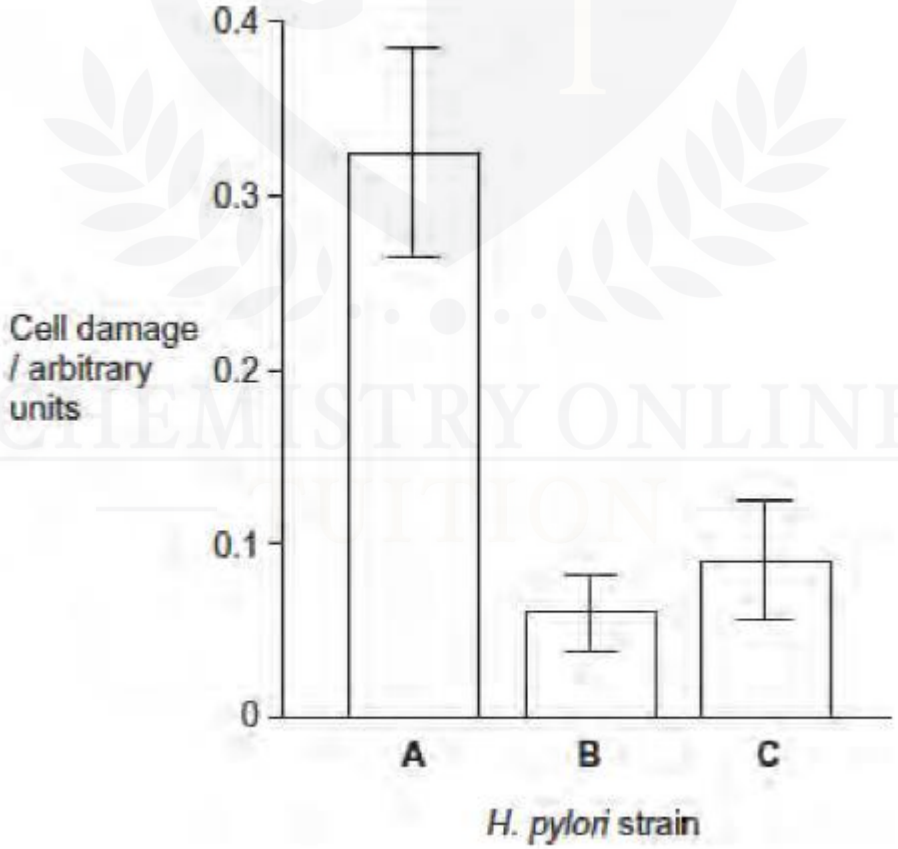
The researchers cultured several H. pylori strains in liquid media.

The compounds that each of these strains releases are displayed in the table below.

H. pylori strain	Substances released by the *H. pylori* cells	
	Toxin	Enzyme that neutralises acid
A	✓	✓
B	×	✓
C	✓	×

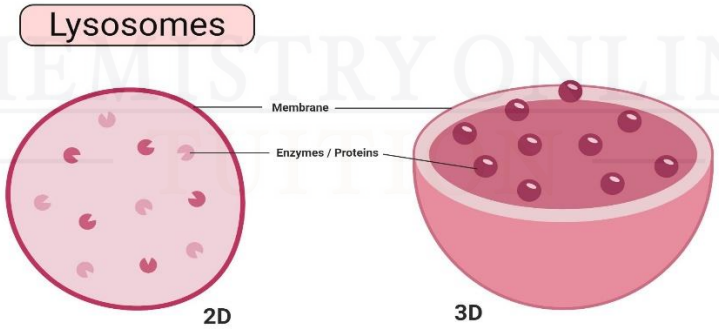
To obtain liquids free of cells, the scientists centrifuged the cultures of each strain. Each liquid was added to a human cell culture. The degree of harm to the human cells was then noted.

The outcomes are displayed below. The error bars display one standard deviation, or ± 1.



(a) Describe and clarify how the scientists were able to obtain a liquid devoid of cells by centrifuging the culture. **(3)**

(b) The activity of lysosomes was used by the scientists to gauge cell damage. Describe one role for lysosomes. **(1)**



(c) The H. pylori bacteria secrete an enzyme that balances acidity. Identify one benefit that H. pylori has from producing this enzyme. **(2)**

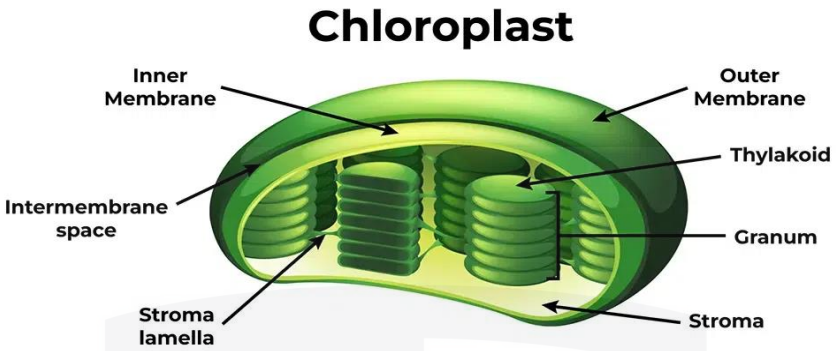
(d) What do these data imply about the harm that the acid-neutralizing enzyme and the toxin do to human cells? Give an explanation for your response. **(3)**

(e) The researchers conducted additional research. Before adding the liquid from strain, A to a human cell culture, they gave it a treatment with an enzyme that breaks down proteins. There was no evidence of cell damage.

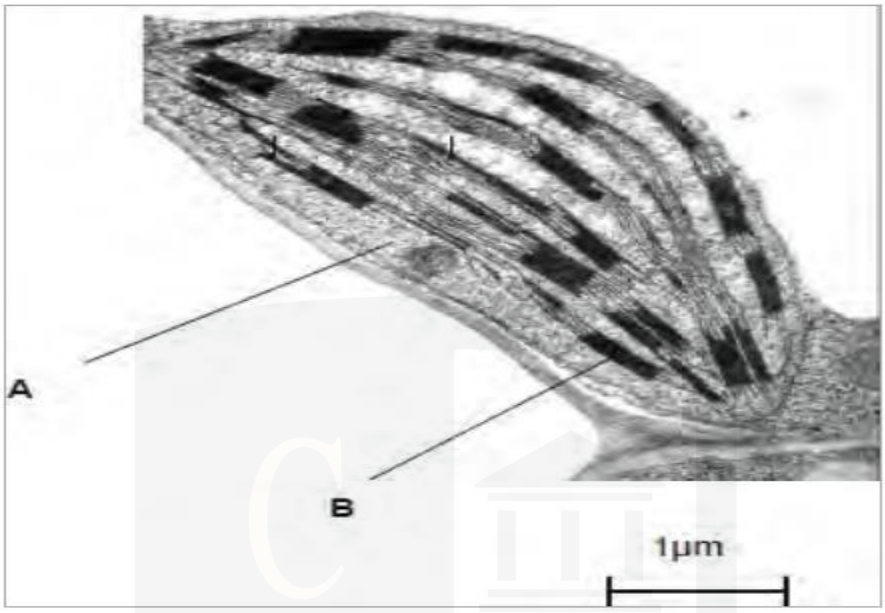
Explain why the cells were not harmed. **(3)**

3.

(a) Explain the process by which you could separate chloroplasts from leaf tissue using cell fractionation. **(3)**



An electron microscope photo of a chloroplast is displayed in the figure below.



(b) Give names to the chloroplast A and B regions. **(2)**

Name of **A**

Name of **B**

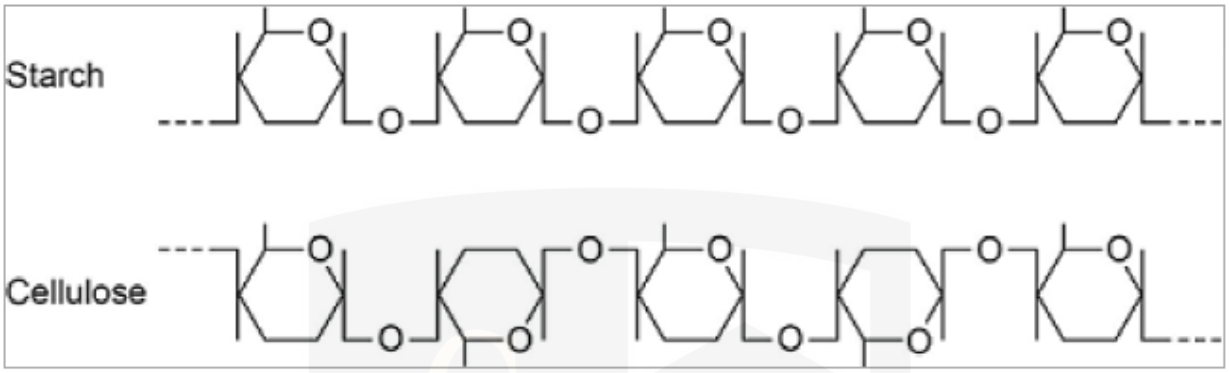
(c) Determine the chloroplast's length from the above-mentioned figure. **(1)**

Answer .....

4.

Two significant polysaccharides found in plants are starch and cellulose.

Parts of a cellulose and starch molecule are depicted in the following diagram.



(a) Describe how the cellulose and starch molecules differ structurally from one another as illustrated in the above diagram. **(2)**

(b) Every molecule is tailored to its specific purpose.

Describe one way that the molecules of starch have been modified for their purpose in plant cells. **(2)**

(c) Describe the adaptations made to cellulose molecules to suit their purpose in plant cells. **(3)**

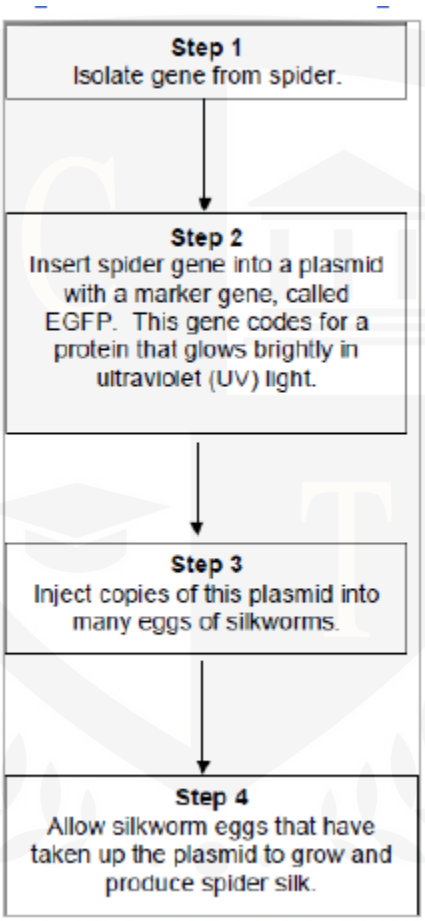
5.

The silk fibers secreted by silkworms are collected and utilized to make silk fabrics.

Researchers have created genetically modified (GM) silkworms with a spider gene.

The spider web protein, or "spider silk," secreted by the genetically modified silkworms is stronger than the protein found in regular silk fibers.

The figure below depicts the technique the scientists employed.



(a) Explain the reason behind injecting the plasmids into the silkworm eggs as opposed to the silkworms themselves. **(2)**

(b) Explain the selection of the EGFP gene and the use of a marker gene by the scientists. **(2)**

The researchers made sure the spider gene was only expressed in the silk gland cells.

(c) In order to guarantee that the spider gene was exclusively expressed in the silk glands of the silkworms, what would the scientists have added to the plasmid in addition to the spider gene? **(1)**

(d) Provide two arguments for the significance of the spider genes exclusive expression in the silkworms silk glands. **(2)**

1.

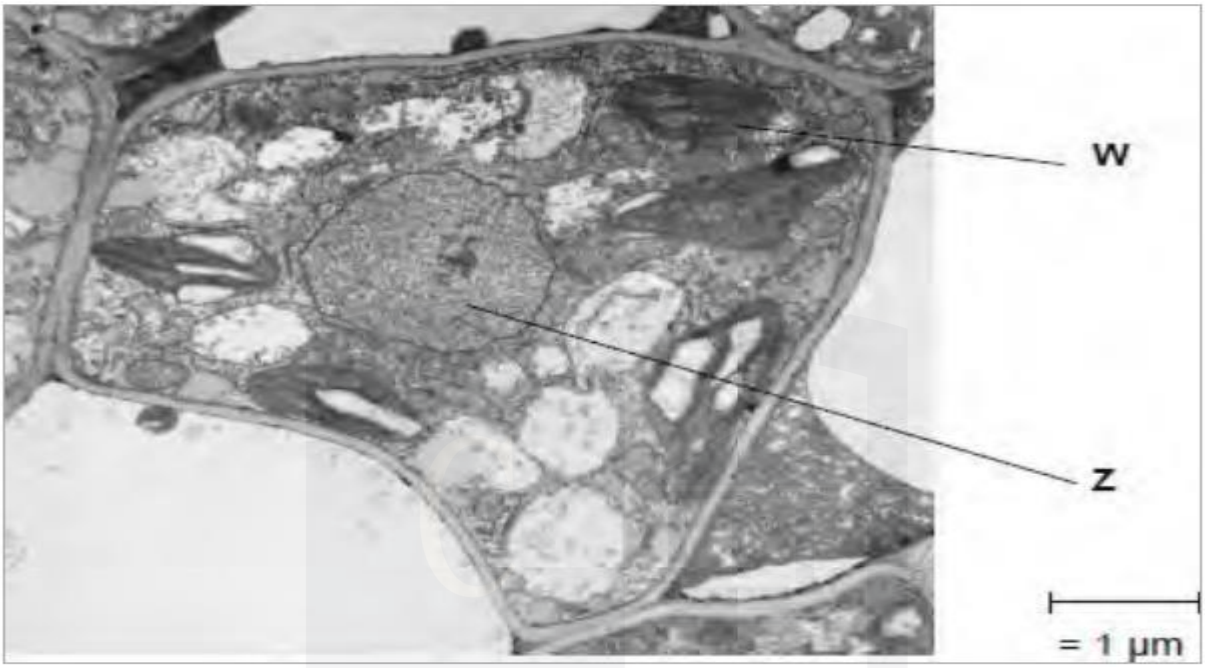
2.

I am Sorry !!!!!

6.

(a) Give an example of how to temporarily mount a piece of plant tissue so that you can use an optical (light) microscope to see where the starch grains are located in the cells. **(4)**

A microscopic view of a plant cell is displayed in the figure below.



(b) Identify and describe the structures with the labels W and Z. **(2)**

Name of **W**

Function of **W**

Name of **Z**

Function of **Z**

(c) The image in the above figure was created using a transmission electron microscope. Describe why. **(2)**

(d) Determine the image's magnification using the formula in part (a) of the figure. **(1)**

Answer = ...

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