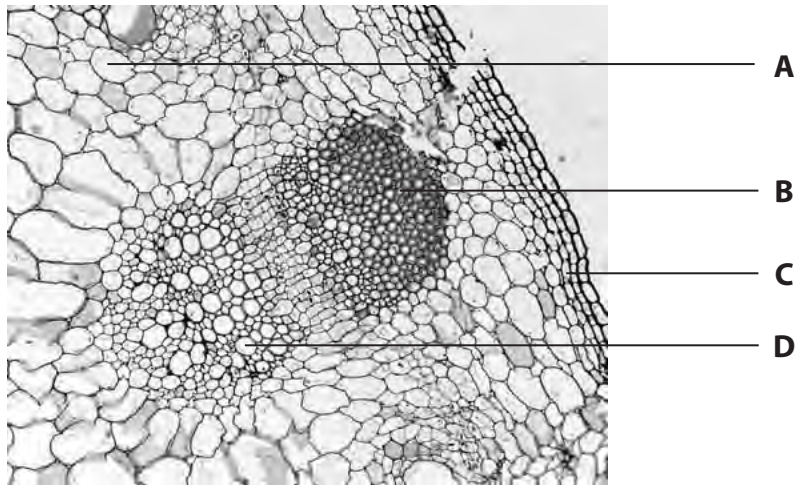


- 1 The photograph below shows a cross-section through part of the stem of a sunflower (*Helianthus annuus*) as seen using a microscope.



Magnification $\times 200$

- (a) Give the letter that correctly identifies the plant tissues shown in the photograph above.

(2)

Sclerenchyma

Xylem

- (b) Statements concerning xylem and sclerenchyma tissue are shown in the table below. Place a cross in the box to indicate whether each statement is true or false.

(4)

Statement	True	False
Both tissues have a structural function	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Both tissues have a transport function	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
End plates are missing in xylem vessels	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Xylem vessels have tapered ends	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2 Plants produce a variety of material useful to humans, such as starch, cellulose and fibres.

(a) Starch can be used to form packaging.

Explain why it may be better to make packaging from starch rather than from oil-based products.

(2)

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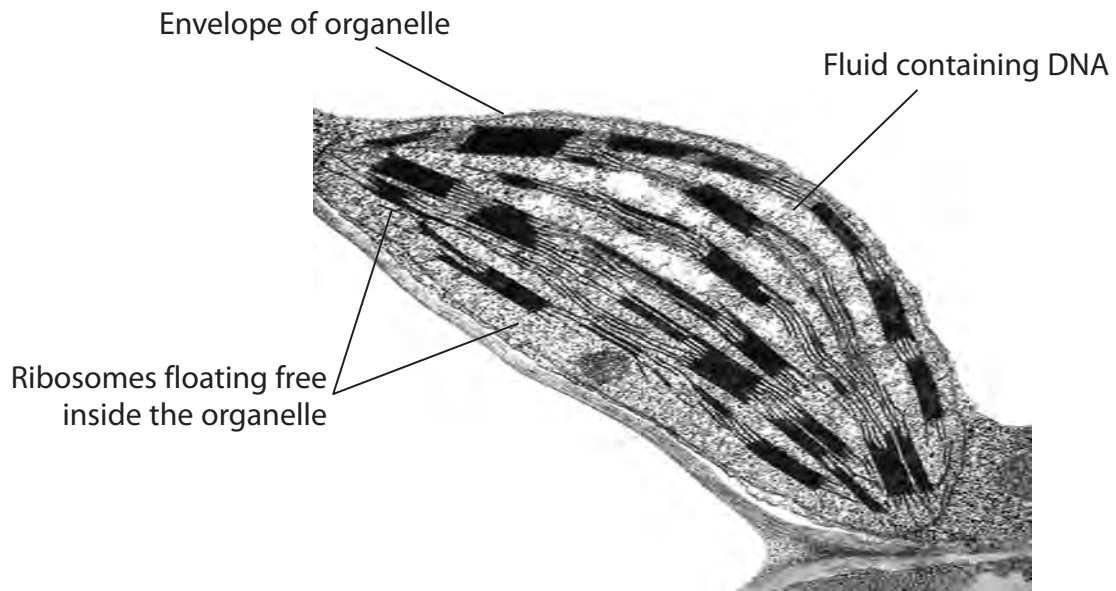
(b) The table below gives three statements about starch and cellulose.

Complete the table by placing a tick (✓) in the box, if the statement is correct, and if the statement is incorrect, place a cross (✗) in the appropriate box.

(3)

Statement	Starch	Cellulose
Consists of microfibrils held together by hydrogen bonds		
Found in amyloplasts		
Made up of β -glucose monomers		

(c) The organelle, shown in the electron microscope image below, contains the monomers of starch.



Magnification x10 000

Dr. Jeremy Burgess / Science Photo Library

A student incorrectly identified this organelle as rough endoplasmic reticulum because it had ribosomes inside it.

(i) Name this organelle.

(1)

(ii) Using the labels on the diagram and your own knowledge, give **two** reasons why it is **not** rough endoplasmic reticulum.

(2)

Reason 1

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Reason 2

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(d) The stem of a plant contains xylem vessels and sclerenchyma fibres.
Compare the functions of xylem vessels with the functions of sclerenchyma fibres.

(3)

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(Total for Question 2 = 11 marks)

- (ii) Cellulose molecules form cellulose microfibrils.
Explain how the arrangement of cellulose microfibrils contributes to the physical properties of plant fibres.

(2)

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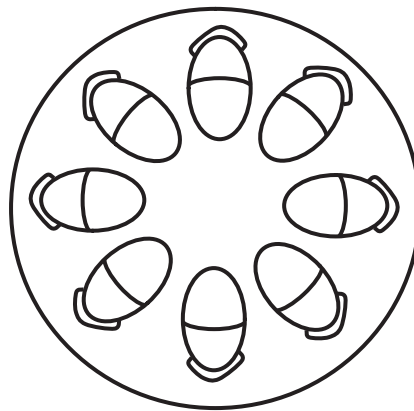
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- (c) (i) The diagram below shows a transverse section through a stem.
On the diagram, put a label **X** to indicate where xylem vessels are present.

(1)



- (ii) Give **two** functions of xylem vessels.

(2)

1

2

(Total for Question 3 = 11 marks)

4 Bacteria are found in a wide range of habitats. Some bacteria can cause harm whilst others are useful to humans.

(a) During the testing of a new anti-bacterial drug, a double blind trial may be used. Explain what is meant by a **double blind trial** and suggest why it is important.

(3)

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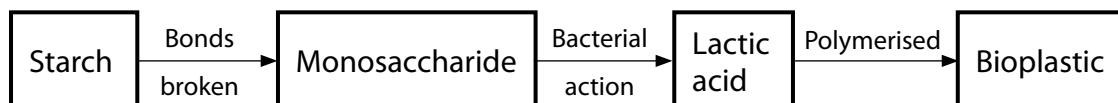
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(b) Bacteria can be used in the production of bioplastic from starch. Bioplastic is a more sustainable form of packaging than oil-based plastics. Part of the conversion process is shown below.



(i) Name the bond that is broken to convert starch into its monosaccharide building blocks.

(1)

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(ii) Name the monosaccharide formed when the bonds in starch are broken.

(1)

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(iii) Suggest why bioplastic is described as a more sustainable form of packaging than oil-based plastics.

(2)

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(iv) Bioplastic is biodegradable. Suggest **one** environmental advantage of using biodegradable packaging.

(1)

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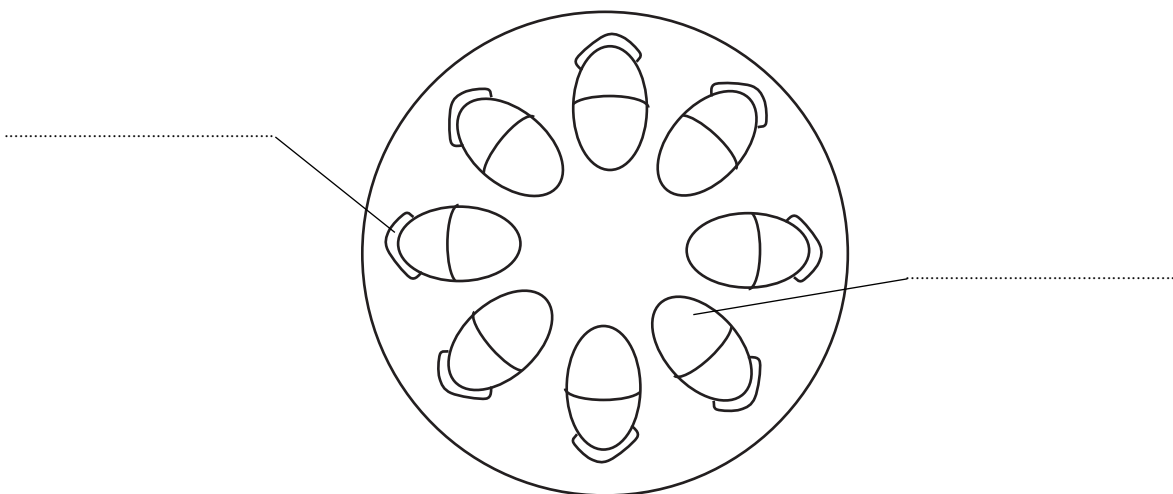
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(c) As well as starch, plants supply other useful products such as plant fibres.

The diagram below shows a transverse section of a stem. Complete the diagram by writing the correct name for each of the parts of the stem alongside the lines on the diagram.

(2)



(Total for Question 4 = 10 marks)