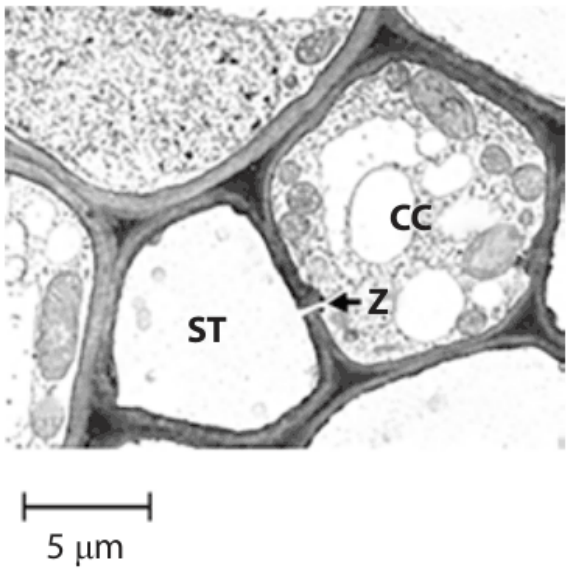
Plant Cells, Plant Fibres and Polysaccharides (Topic 4): Edexcel SNAB A Level Biology Exam Questions by Topic

20 questions · 54 marks · about 65 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · information from earlier in the question

2 The electron micrograph shows a cross-section through part of a vascular bundle, containing phloem tissue.



A sieve tube element is labelled '**ST**'. A cell called a companion cell is labelled '**CC**'.

Question 1 · AS Paper 2 · June 2016 · Q2(d)(i) · 2 marks

(d) Companion cells are found next to sieve tube elements.

(i) Describe the structure labelled **Z** that connects the cytoplasm of the companion cell to the sieve tube element.

(2)

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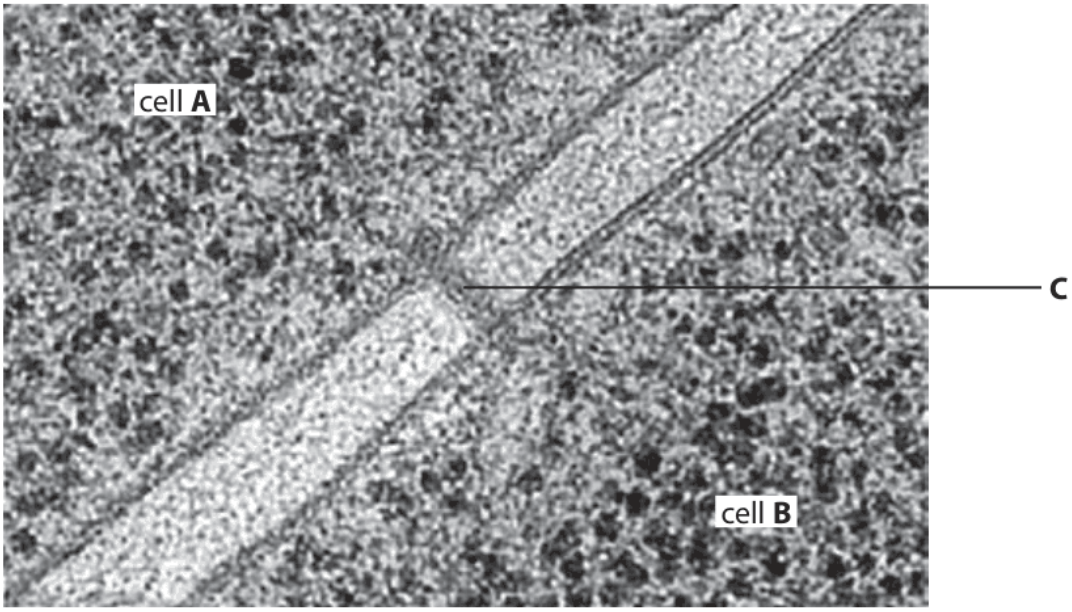
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Question 2 · AS Paper 2 · June 2018 · Q3(a)(i) · 1 mark

3 The electronmicrograph shows the junction between two plant cells, **A** and **B**.



(a) (i) Name the structure labelled **C**.

(1)

.....

Question 3 · AS Paper 2 · June 2018 · Q3(a)(ii) · 2 marks

(ii) Explain the function of the structure labelled **C**.

(2)

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Question 4 · AS Paper 2 · June 2017 · Q1(c) · 3 marks

(c) Some plant cells also contain the polymer starch.

Explain how the structure and properties of starch are related to its function as a storage molecule.

(3)

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Question 5 · A level Paper 1 · June 2024 · Q6(a) · 3 marks

6 Anthropogenic climate change could have caused the warmest years on record in the United Kingdom from 2015 to 2021.

This is leading to changes in the germination of plant seeds.

Some seeds store starch.

(a) Describe the structure of starch.

(3)

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Question 6 · AS Paper 2 · June 2024 · Q6(a) · 4 marks

6 Fibres can be extracted from tissues of some plants. There is often variation in the composition of these fibres.

(a) Plant fibres contain cellulose. There are similarities and differences between the structures of cellulose and starch.

Compare and contrast the structures of molecules of cellulose and starch.

(4)

Question 7 · A level Paper 2 · June 2019 · Q6(b)(ii) · 1 mark

(ii) The cellulose molecules form microfibrils.

Name the bond between adjacent cellulose molecules in a cellulose microfibril.

(1)

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Question 8 · AS Paper 2 · June 2019 · Q5(a) · 4 marks

5 Bamboo plants produce fibres that have a high tensile strength.

The photograph shows part of a bamboo plant.



(a) Plant fibres contain cellulose in their cell walls.

Explain how tensile strength is related to the arrangement of cellulose in plant fibres.

(4)

Question 9 · AS Paper 2 · June 2017 · Q1(b)(ii) · 1 mark

(ii) Name a plant tissue that has lignin in its cell walls.

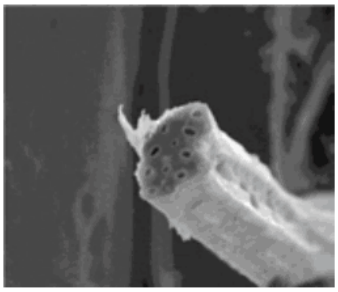
(1)

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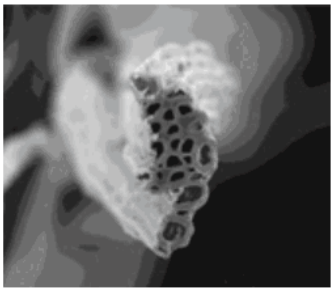
Question 10 · AS Paper 2 · June 2017 · Q6(c) · 4 marks

(c) Fibres of curaua, jute and sisal were examined using an electron microscope.

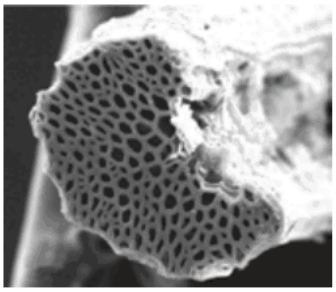
These electron micrographs were examined and the physical features of the fibres were measured.



Curaua



Jute



Sisal

Type of fibre	Cell wall thickness / µm	Diameter of lumen / µm	Mean tensile strength / MPa
Curaua	3.5	4.0	543
Jute	2.5	6.7	249
Sisal	2.6	8.2	484

Analyse these data to evaluate the relationship between the structure of these plant fibres and their tensile strength.

(4)

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Question 11 · A level Paper 3 · June 2017 · Q1(d) · 2 marks

(d) Tissues that contain lignin provide strength to plant fibres.

Describe the positions in the stem of those tissues that contain lignin.

(2)

Question 12 · AS Paper 2 · June 2025 · Q3(b)(ii) · 4 marks

(ii) Explain how the features of xylem vessels are related to its functions.

(4)

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Question 13 · A level Paper 1 · June 2025 · Q5(c) · 4 marks

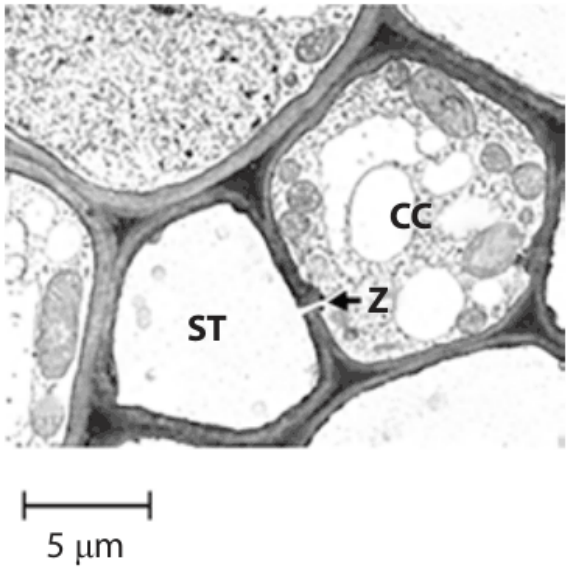
(c) Explain how the structure of tissues in the stem enables water to be transported from the roots to the leaves.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 14 · information from earlier in the question

2 The electron micrograph shows a cross-section through part of a vascular bundle, containing phloem tissue.



A sieve tube element is labelled '**ST**'. A cell called a companion cell is labelled '**CC**'.

Question 14 · AS Paper 2 · June 2016 · Q2(d)(ii) · 3 marks

(ii) The electron micrograph shows a difference in the number of mitochondria in the sieve tube element and in the companion cell.

Explain the difference in the number of mitochondria.

(3)

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Question 15 · AS Paper 2 · June 2016 · Q3(b)(iii) · 3 marks

(iii) The concentration of magnesium ions in the soil was found to be very low.

Explain the effects of a shortage of magnesium ions on a plant.

(3)

Question 16 · AS Paper 2 · June 2024 · Q1(b) · 3 marks

(b) Calcium ions are transported through plant tissues.

Explain the importance of calcium ions to plants.

(3)

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Question 17 · A level Paper 1 · June 2024 · Q1(b) · 3 marks

(b) Describe the role of mineral ions in the production of plant biomass.

(3)

Question 18 · AS Paper 2 · June 2025 · Q3(c) · 2 marks

(c) Fibres for textiles can also be made from oil-based plastics.

Explain why the use of fibres from pineapple leaves is more sustainable than producing fibres from oil-based plastics.

(2)

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Question 19 · A level Paper 1 · November 2021 · Q7(c) · 3 marks

(c) Fibres can be extracted from the stems of nettle plants and used to make clothing.

Explain why the production of fibres from nettles is more sustainable than fibres produced from crude oil.

(3)

Question 20 · A level Paper 3 · June 2017 · Q1(a) · 2 marks

1 Plant fibres and oil-based plastics have both been used to make ropes.

(a) Describe one advantage and one disadvantage of using ropes made from plant fibres rather than ropes made from oil-based plastics.

(2)

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Mark schemes

Question 1 · AS Paper 2 · June 2016 · Q2(d)(i) · 2 marks

Question Number	Answer
2(d)(i)	A description making reference to the following: • a pit (in the cell wall) / plasmodesma (1) • the cell wall has only one layer / only primary cell wall present / a strand of cytoplasm (1)

Additional Guidance	Mark
ALLOW plasmodesmata ALLOW a narrow channel through the cell wall description must match structure named	(2)

Question 2 · AS Paper 2 · June 2018 · Q3(a)(i) · 1 mark

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	plasmodesma (1)	ALLOW plasmodesmata	(1)

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Question 3 · AS Paper 2 · June 2018 · Q3(a)(ii) · 2 marks

Question Number	Answer
3(a)(ii)	An explanation which makes reference to the following: • cytoplasmic connection (between cells) (1) • which allows { transport / communication } (between cells) (1)

Additional Guidance	Mark
ALLOW cytoplasm continuous between the cells ALLOW exchange of materials between cells	(2)

Question 4 · AS Paper 2 · June 2017 · Q1(c) · 3 marks

Question Number	Answer
1(c)	An explanation that makes reference to three the following: • contains glucose needed for {respiration/energy} **(1)** • insoluble so { has no osmotic effect / remains in the cell } **(1)** • amylose is coiled making starch compact (so more can be stored) **(1)** • amylopectin {is branched/contains 1-6 glycosidic bonds} so is rapidly hydrolysed **(1)**

Additional Guidance	Mark
ALLOW description of osmotic effect eg. water moving into cell ALLOW broken down	(3)

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Question 5 · A level Paper 1 · June 2024 · Q6(a) · 3 marks

Question Number	Answer
6(a)	A description that makes reference to three of the following • {polymer / polysaccharide} of alpha glucose (1) • made up of amylose and amylopectin (1) • amylose is unbranched and amylopectin is branched (1) • amylose has 1,4-glycosidic bonds and amylopectin has 1,6 and 1,4 glycosidic bonds (1)

Additional guidance	Mark
DO NOT ALLOW beta glucose ALLOW amylose is {linear / straight-chained}	(3)

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Question 6 · AS Paper 2 · June 2024 · Q6(a) · 4 marks

Question number	Answer
6(a)	An answer that makes reference to four of the following: Similarities • both are {polysaccharides / chains of glucose} (1) • both contain (1-4) glycosidic bonds (1) Differences • starch is made of alpha-glucose and cellulose is made of beta-glucose (1) • (only) {starch /amylopectin} contains 1-6 glycosidic bonds (1) • {starch /amylopectin} is branched and cellulose is not (1)

Additional guidance	Mark
ALLOW polymer made of glucose monomers	(4)

Question 7 · A level Paper 2 · June 2019 · Q6(b)(ii) · 1 mark

Question Number	Answer	Additional Guidance	Mark
6(b)(ii)	• hydrogen / H (bond)		**(1)**

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Question 8 · AS Paper 2 · June 2019 · Q5(a) · 4 marks

Question Number	Answer
5(a)	An explanation that makes reference to four of the following: • (many) cellulose molecules held together in microfibrils (1) • hydrogen bonds hold cellulose {molecules / chains} together (1) • criss cross arrangement of {cellulose / microfibrils} provide strength in {both / different} directions (1) • (cellulose/microfibrils) embedded in { a matrix / pectin / pectate / hemicellulose} (1) • (which prevents) {cellulose / microfibrils} from sliding over each other (1)

Additional Guidance	Mark
ALLOW which holds microfibrils in place	(4)

Question 9 · AS Paper 2 · June 2017 · Q1(b)(ii) · 1 mark

Question Number	Answer
1(b)(ii)	An answer that makes reference to the following: • xylem / sclerenchyma (1)

Additional Guidance	Mark
DO NOT ALLOW mark if phloem is mentioned. IGNORE vessels etc	(1)

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Question 10 · AS Paper 2 · June 2017 · Q6(c) · 4 marks

Question Number	Answer
6(c)	An answer that makes reference to the following: • (positive) correlation between cell wall thickness and tensile strength **(1)** • due to presence of lignin **(1)** • no correlation between lumen diameter and tensile strength **(1)** • curaua fibres strongest as they had the thickest cell walls **(1)**

Additional Guidance	Mark
ALLOW lumen diameter has {little / no effect} on tensile strength ALLOW converse statements, e.g. jute has thinnest cell wall and is the weakest fibre	**(1)**

Question 11 · A level Paper 3 · June 2017 · Q1(d) · 2 marks

Question Number	Answer
1(d)	An answer that makes reference the following: • sclerenchyma (fibres) on the outer side of the {vascular bundle / phloem} **(1)** • xylem (vessels) on the {inner side / inside} of the vascular bundle **(1)**

Additional Guidance	Mark
ALLOW correctly labelled diagram ALLOW sclerenchyma outside vascular bundle ALLOW xylem in the vascular bundle	**(2)**

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Question 12 · AS Paper 2 · June 2025 · Q3(b)(ii) · 4 marks

Question number	Answer
3(b)(ii)	An explanation that makes reference to four of the following: • (xylem vessels are) hollow / have no cytoplasm / have no end walls (1) • (therefore) no resistance to flow of water / allows uninterrupted flow of water (1) • (cell) walls contain lignin (1) • (lignin) provides support / enables xylem to withstand pressure (1) • pits in (cell) walls allow transfer of water (1)

Additional guidance	Mark
IGNORE 'dead' ALLOW idea of lignin waterproofing cell walls	(4)

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Question 13 · A level Paper 1 · June 2025 · Q5(c) · 4 marks

Question Number	Answer
5(c)	An explanation that makes reference to four of the following • (water is transported through the stem) in the xylem (1) • walls contain lignin (1) • lignin provides waterproofing (1) • {little / less / reduced} resistance to water flow because there is no {cytoplasm / end walls} (1) • pits in the walls to allow lateral movement (of water) (1)

Additional guidance	Mark
DO NOT ALLOW if both xylem and phloem referred to in context of just water ALLOW lignin provides strength ALLOW lignin withstands (water) pressure ALLOW {hollow / no organelles} instead of no cytoplasm	(4)

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Question 14 · AS Paper 2 · June 2016 · Q2(d)(ii) · 3 marks

Question Number	Answer
2(d)(ii)	An explanation making reference to three of the following: • (the micrograph shows that) the CC has many mitochondria whereas the ST has { few / none } (1) • the role of the ST is to provide a channel, so cellular contents are kept to a minimum (1) • the ST has { limited / no } ability to carry out (aerobic) respiration (1) • { ATP / energy } is supplied to the ST from the CC (1)

Additional Guidance	Mark
ALLOW CC has **more** mitochondria / ST has few**er** mitochondria ALLOW CC is able to respire more ALLOW use of { ATP / energy } for active transport for phloem loading / described	(3)

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Question 15 · AS Paper 2 · June 2016 · Q3(b)(iii) · 3 marks

Question Number	Answer
3(b)(iii)	An explanation that makes reference to the following points: • (a shortage of magnesium ions) limits the production of chlorophyll (1) • lack of { glucose / carbohydrate / cellulose } due to less photosynthesis (1) • (therefore) plant leaves may be yellow / plants may be small (1)

Additional Guidance	Mark
ALLOW a named carbohydrate / sugar ALLOW slow growth, stunted growth, pale leaves, leaves not green IGNORE wilting	(3)

Question 16 · AS Paper 2 · June 2024 · Q1(b) · 3 marks

Question number	Answer
1(b)	An explanation that makes reference to three of the following: • used in calcium pectate (1) • found in the middle lamella (1) • needed to connect cell walls of neighbouring cells (1) • supports cellulose microfibrils in cell wall (1)

Additional guidance	Mark
ALLOW pectin ALLOW holds cells together	(3)

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Question 17 · A level Paper 1 · June 2024 · Q1(b) · 3 marks

Question Number	Answer
1(b)	A description that makes reference to three of the following • nitrates are needed for amino acid synthesis (1) • magnesium (ions) are needed to make chlorophyll (1) • calcium (ions) are needed for {calcium pectate / middle lamella} (1) • chlorophyll is needed for photosynthesis and the production of { organic molecules / biomass } (1) • phosphates are needed for { membranes / phospholipids / nucleic acids / ATP / NADP } (1)

Additional guidance	Mark
ALLOW nucleotides / (nitrogenous) bases / DNA / RNA / nucleic acids / ATP / protein IGNORE nitrogen ions	(3)

Question 18 · AS Paper 2 · June 2025 · Q3(c) · 2 marks

Question number	Answer
3(c)	An explanation that makes reference to two of the following: • (pineapple plants) can be regrown / are renewable (1) • therefore the resource { will not run out / is available for future generations} (1) • oil is a finite resource (1)

Additional guidance	Mark
	(2)

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Question 19 · A level Paper 1 · November 2021 · Q7(c) · 3 marks

Question Number	Answer
7(c)	An explanation that makes reference to three of the following • nettle plants can be grown so they are renewable (1) • (crude) oil (is non-renewable and) will run out (1) • use of fibres from nettles will be available to future generations (1) • clothing made of nettle fibres is biodegradable (1)

Additional guidance	Mark
ALLOW description of renewable eg will not run out	**(3)**

Question 20 · A level Paper 3 · June 2017 · Q1(a) · 2 marks

Question Number	Answer
1(a)	A description that makes reference to the following: • Advantage – being sustainable / {can decompose / is biodegradable} **(1)** • Disadvantage – less strong / {can decompose/ is biodegradable } **(1)**

Additional Guidance	Mark
Biodegradable / can decompose must be qualified if given as both an advantage and a disadvantage ALLOW renewable or more plants can be grown	**(2)**

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