A-Level Edexcel

BIOLOGY

UNIT 2(IAL)

2020 — 2025

1 – ((WBI11)/2(IAL)_Summer_2020_Q1) – *Cells, Development, Biodiversity And Conservation*

Plants contain starch and cellulose.

(a) (i) Which part of a plant cell stores starch?

(1)

- ☐ **A** amyloplast
- ☐ **B** middle lamella
- ☐ **C** plasmodesmata
- ☐ **D** tonoplast

(ii) How many of the following statements about starch are correct?

1. it has a compact shape
2. it contains 1,6 glycosidic bonds only
3. it is a polymer of β-glucose
4. it is a polypeptide

(1)

- ☐ **A** one
- ☐ **B** two
- ☐ **C** three
- ☐ **D** four

(iii) How many of the following contain cellulose?

1. phloem
2. sclerenchyma
3. vacuole
4. xylem

(1)

- ☐ **A** one
- ☐ **B** two
- ☐ **C** three
- ☐ **D** four

(b) Microfibrils are composed of cellulose.

The photograph shows the arrangement of microfibrils in a plant cell wall, as seen using an electron microscope.

(Source: © Biophoto associates/Science photo library)

Explain how the structures of cellulose and microfibrils increase the strength of a plant cell wall.

Use the information in the photograph to support your answer.

(3)

2 – ((WBI11)/2(IAL)_Summer_2020_Q2) – *Cells, Development, Biodiversity And Conservation*

All organisms contain one or more cells.

(a) (i) In which of the following is a cell membrane present?

(1)

- ☒ **A** animal cells only
- ☒ **B** animal and plant cells only
- ☒ **C** plant and prokaryotic cells only
- ☒ **D** animal, plant and prokaryotic cells

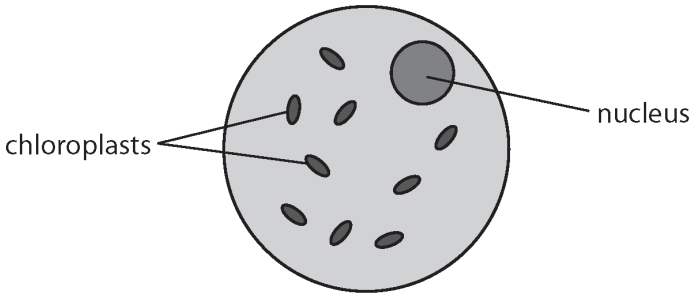
(ii) In which of the following is a cell wall present?

(1)

- ☒ **A** plant cells only
- ☒ **B** animal and plant cells only
- ☒ **C** plant and prokaryotic cells only
- ☒ **D** animal, plant and prokaryotic cells

(b) Sailor's eyeball (*Valonia ventricosa*) is a single-celled, spherical organism.

The diagram shows one of these cells.



(i) The diameter of this cell is 25 μm.

Calculate the magnification of the diagram.

(2)

Answer .....

(ii) This cell contains chloroplasts.

State the function of these chloroplasts.

(1)

.....

.....

.....

(iii) This cell is not a prokaryotic cell as it contains chloroplasts.

Give **one** other reason why this organism is not a prokaryotic cell.

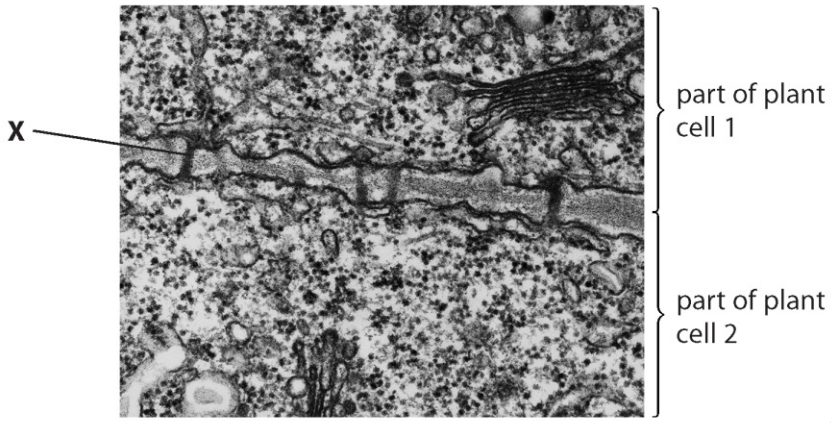
(1)

.....

.....

.....

(c) The photograph shows part of two adjoining plant cells, as seen using an electron microscope.



(Source: © biophoto associates/Getty Images)

(i) Name the part labelled **X**.

(1)

.....

(ii) Explain the function of the part labelled **X**.

(2)

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.....

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.....

.....

.....

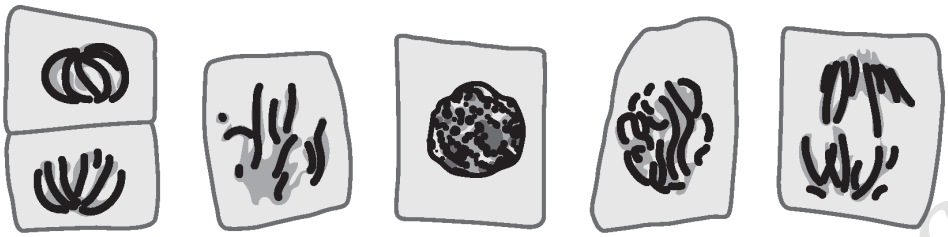
3 – ((WBI11)/2(IAL)_Summer_2020_Q3) – *Cells, Development, Biodiversity And Conservation*

Cells undergo cell division.

(a) The diagrams show cells from a plant.

The cells are in different stages of division.

These cells do not show the correct order for the process of division by mitosis.



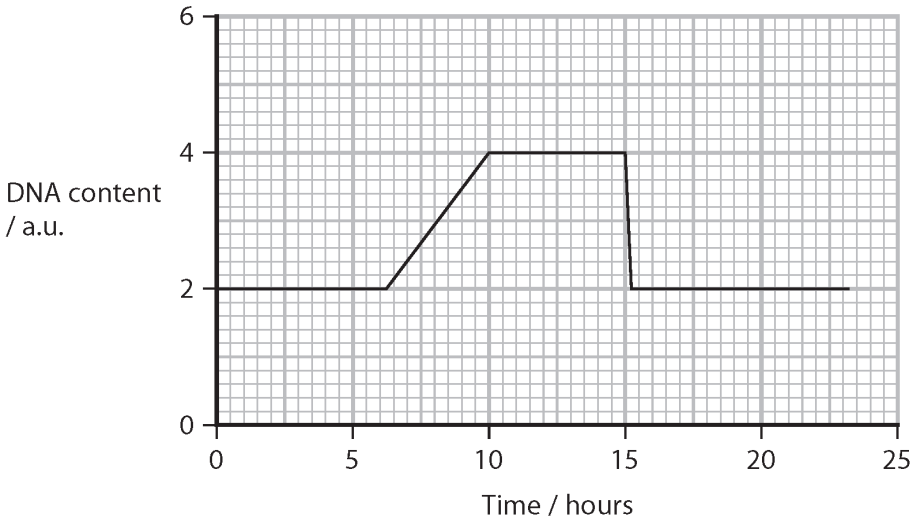
A **B** **C** **D** **E**

Which of the following shows the correct order for the process of division by mitosis?

(1)

	1st	2nd	3rd	4th	5th
☒ **A**	A	E	B	D	C
☒ **B**	A	D	C	E	B
☒ **C**	C	D	B	E	A
☒ **D**	C	B	E	D	A

(b) The graph shows the changes in the DNA content of a cell during one cell cycle.

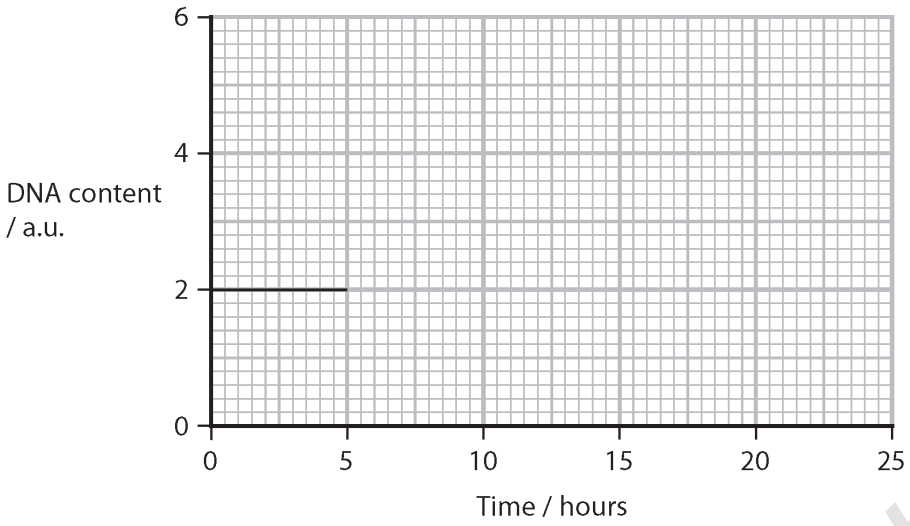


(i) Explain the changes in the DNA content as shown by this graph.

(4)

(ii) Complete the graph to show how the DNA content would change if the cell had undergone meiosis to form gametes.

(2)



ANSWERS

1 – ((WBI11)/2(IAL)_Summer_2020_Q1) – *Cells, Development, Biodiversity And Conservation*

Question Number	Answer	Additional guidance	Mark
(a)(i)	The only correct answer is A amyloplast *B is not correct because starch is not stored in the middle lamella* *C is not correct because starch is not stored in the plasmodesmata* *D is not correct because starch is not stored in the tonoplast*		**(1)**

Question Number	Answer	Additional guidance	Mark
(a)(ii)	The only correct answer is A one *B is not correct because starch contains 1,4 and 1,6 glycosidic bonds, is a polymer of α-glucose and is a polysaccharide* *C is not correct because starch contains 1,4 and 1,6 glycosidic bonds, is a polymer of α-glucose and is a polysaccharide* *D is not correct because starch contains 1,4 and 1,6 glycosidic bonds, is a polymer of α-glucose and is a polysaccharide*		**(1)**

Question Number	Answer	Additional guidance	Mark
(a)(iii)	The only correct answer is C three *A is not correct because phloem, sclerenchyma and xylem cell walls contain cellulose* *B is not correct because phloem, sclerenchyma and xylem cell walls contain cellulose* *D is not correct because the vacuole does not contain cellulose*		**(1)**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that includes the following points: • because there are hydrogen bonds between (adjacent) cellulose molecules (1) • {layers / sheets} of microfibrils (1) • which have microfibrils at different angles (therefore it increases the strength) (1)	ignore {layers / sheets} of cellulose ACCEPT microfibrils arranged in a {criss-cross pattern / mesh}	**(3)**

2 – ((WBI11)/2(IAL)_Summer_2020_Q2) – *Cells, Development, Biodiversity And Conservation*

Question Number	Answer	Additional guidance	Mark
(a)(i)	The only correct answer is D animal, plant and prokaryotic cells *A is not correct because all three cell types contain a cell membrane* *B is not correct because all three cell types contain a cell membrane* *C is not correct because all three cell types contain a cell membrane*		**(1)**

Question Number	Answer	Additional guidance	Mark
(a)(ii)	The only correct answer is C plant and prokaryotic cells only *A is not correct because prokaryotic cells contain a cell wall* *B is not correct because animal cells do not contain a cell wall* *D is not correct because animal cells do not contain a cell wall*		**(1)**

Question Number	Answer	Additional guidance	Mark
(b)(i)	A calculation in which: • cell diameter measured and converted into micrometres (1) • diameter divided by 25 with no units (1) OR • 25 converted to mm • diameter divided by 0.025 with no units	<u>Example of calculation:</u> 42mm=42000 µm 42000 ÷ 25 = x1680 ecf for ±1mm and incorrect conversions Correct answer with no units and with no working scores full marks	**(2)**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An answer that includes one of the following points: • (site of) photosynthesis / converts light energy to {chemical energy / ATP} (1)	ACCEPT formation of correct named product of photosynthesis e.g. glucose ignore makes food	**(1)**

Question Number	Answer	Additional guidance	Mark
(b)(iii)	An answer that includes the following point: • this organism has a nucleus / prokaryotic cells do not contain a nucleus (1)	DO NOT ACCEPT cell membrane / cytoplasm ignore contains membrane bound organelles	**(1)**

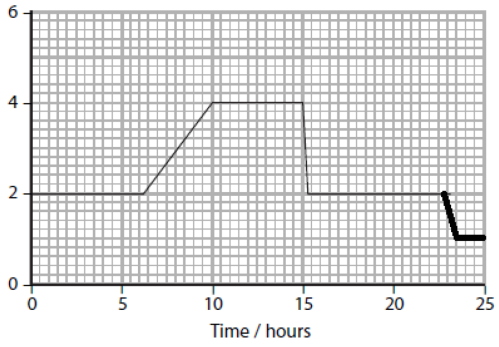
Question Number	Answer	Additional guidance	Mark
(c)(i)	• plasmodesma / plasmodesmata (1)		**(1)**

Question Number	Answer	Additional guidance	Mark
(c)(ii)	An explanation that includes the following points: • communication between / connects (connected) cells (1) • therefore signalling substances pass through {symplast / cytoplasm} / cytoplasmic streaming / transport of suitable named molecules e.g. minerals, water, glucose, amino acids, proteins, RNA (1)	allow ECF for pits, cell wall and middle lamella only pits • communication between / connects (connected) cells • therefore transport of suitable named molecules cell wall • (sieve like network made of) cellulose fibres support the cell • therefore helps retain rigid structure / prevent cell lysis middle lamella • joins (adjacent) cell (walls) together • therefore increases {strength / stability} of {plant / cell (wall)}	**(2)**

3 – ((WBI11)/2(IAL)_Summer_2020_Q3) – *Cells, Development, Biodiversity And Conservation*

Question Number	Answer	Additional guidance	Mark
(a)	C - C D B E A The only correct answer is C *A is not correct because the correct order is C D B E A* *B is not correct because the correct order is C D B E A* *D is not correct because the correct order is C D B E A*		**(1)**

Question Number	Answer	Additional guidance	Mark
(b)(i)	An explanation that includes four of the following points: • DNA content remains constant during {G1 / G2/ mitosis} (1) • the DNA content doubles (1) • due to {DNA / chromosome} replication / S phase / replication (1) • the cell divides / cytokinesis (after 15 hours) (1) • (therefore) it will produce (two) diploid (daughter) cells (1)	ACCEPT DNA content stays at 2 during G1 / DNA content stays at 4 during {G2 / mitosis} ACCEPT DNA content increases {to 4 / by 2} ignore interphase ignore telophase ACCEPT (therefore) it will produce (two) genetically identical (daughter) cells	**(4)**

Question Number	Answer	Additional guidance	Mark
(b)(ii)	An answer that includes the following points: • similar shape graph as mitosis (1) • with a further division line to reduce DNA content to {haploid / 1 a.u.} (1)	Example of graph  	**(2)**

4 – ((WBI11)/2(IAL)_Summer_2020_Q4) – *Cells, Development, Biodiversity And Conservation*

Question Number	Answer	Additional guidance	Mark
(a)	A calculation showing the following steps: • mass of bran calculated (1) • mass of fibre calculated (1) • correct answer to two significant figures (1)	Example of calculation (48÷100) x 14 = 6.72 (mg) (6.72÷100) x 43 = 2.889 (mg) 2.9 mg Correct answer with no working scores full marks	**(3)**

Question Number	Answer	Additional guidance	Mark
(b)	An explanation that includes the following points: • more sustainable (than oil-based plastic) (1) • biodegradable / can be broken down by decomposers (1) • carbon neutral (1)	ACCEPT ORA for oil-based plastic ACCEPT renewable / can be regrown / available for future generations ALLOW can decompose ACCEPT {does not contribute to /reduces} {greenhouse effect / global warming}	**(3)**

Question Number	Answer	Additional guidance	Mark
(c)	An explanation that includes three of the following points: • pollen tube transports {generative nucleus/male nuclei} to {embryo sac / ovary / micropyle} (1) • (by releasing) digestive enzymes (1) • one of the male nuclei {fertilises / fuses with} the (two) polar nuclei (1) • (causing) the formation of a {3n/ triploid} endosperm (nucleus) (1)	ACCEPT pollen tube transports {generative nucleus/male nuclei} down the style ACCEPT male gamete / sperm nucleus ACCEPT male gamete / {sperm / haploid} nucleus	**(3)**