



Trial Examination 2023

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**Suggested Solutions**

# **QCE Biology Units 1&2**

Paper 2

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## SECTION 1

### QUESTION 1 (6 marks)

**Component 1:** Vasodilation. This causes blood vessels to expand as blood flow decreases. Therefore, neutrophils have a greater chance to settle at the site of infection or injury.

**Component 2:** Increased permeability. This allows for large white blood cells to exit the blood vessels at the site of infection or injury.

**Component 3:** Phagocytosis. This is a process whereby phagocytes kill the injected microorganism or toxins and release molecular mediators, which contribute to the inflammatory response.

[6 marks]

*1 mark for each correct component identified.*

*1 mark for each correct description.*

### QUESTION 2 (4 marks)

a) stomata, vacuole, waxy cuticles

[3 marks]

*1 mark for each correct structural feature identified.*

b) *Any one of:*

- Xerophytes have fewer stomata than mesophytes.
- Mesophytes have a larger vacuole in their cells, whereas xerophytes have a smaller vacuole.
- Xerophytes have large waxy cuticles on their leaves, whereas mesophytes have thin cuticles.

[1 mark]

*1 mark for identifying one difference between xerophytes and mesophytes.*

### QUESTION 3 (7 marks)

a)

	Component name
<b>A</b>	glomerulus
<b>B</b>	Bowman's capsule
<b>C</b>	proximal convoluted tubule
<b>D</b>	collecting duct
<b>E</b>	loop of Henle

[5 marks]

*1 mark for each correct component name.*

b) Kidneys help regulate water balance in the body by ensuring greater reabsorption of water when the body is dehydrated. This is achieved through the increased permeability of the collecting ducts in response to the release of antidiuretic hormone (ADH).

[2 marks]

*1 mark for describing the reabsorption of water.*

*1 mark for describing the increased permeability of collecting ducts due to ADH.*

**QUESTION 4 (4 marks)***Any four of:*

- large surface area
- moist surface
- short diffusion distance (*only a few cells thick*)
- high number of blood vessels
- steep concentration gradient

*[4 marks]**1 mark for each correct structural feature identified.***QUESTION 5 (3 marks)**

The structure of the root cell has a very high surface area-to-volume ratio, which aids the passive absorption of water and nutrients from the soil. It also has a large vacuole to allow the storage of water and nutrients within the cell to maintain hydrostatic pressure within the plant for longer.

*[3 marks]**1 mark for identifying the high surface area-to-volume ratio and the large vacuole.**1 mark for explaining how the ratio aids in passive transport.**1 mark for explaining how the vacuole aids in the storage of water and nutrients.***QUESTION 6 (7 marks)**

a)

	<b>Component name</b>
<b>A</b>	dendrite
<b>B</b>	cell body
<b>C</b>	axon
<b>D</b>	myelin sheath
<b>E</b>	axon terminal

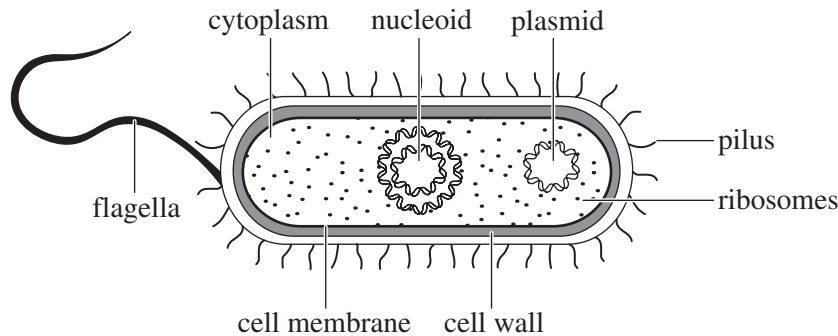
*[5 marks]**1 mark for each correct component name.*b) *For example:*

A nerve impulse is a rapid reversal of the electrical charge across the membrane of a neuron. This is called an action potential. This electrical impulse then travels along the axon to the axon terminals, where it is relayed to the next neuron across the synapse.

*[2 marks]**1 mark for explaining an action potential.**1 mark for explaining the direction of movement of the electrical impulse.*

**QUESTION 7 (7 marks)**

a) Any three of:



[3 marks]

1 mark for each correct physical characteristic.

b) Prokaryotic cells live in aquatic environments. The presence of a flagella indicates the cell's mobility in water.

[2 marks]

1 mark for identifying the environment.

1 mark for justifying the response.

c) Any two of:

- cellular membrane
- ribosomes
- cytoplasm
- cell walls
- flagella (in some cases)

[2 marks]

1 mark for each correct feature identified.

**QUESTION 8 (7 marks)**

a) Enzyme activity increases with temperature until an optimum temperature is reached. At temperatures above its optimum temperature, the enzyme denatures.

[2 marks]

1 mark for describing enzyme activity up to the optimum temperature.

1 mark for describing enzyme activity at temperatures above the optimum temperature.

b) 40°C (The optimum temperature for catalase is indicated by the peak in the graph.)

[1 mark]

1 mark for identifying the optimum temperature.

c) **Denatured:** 45°C. This is indicated when the graph begins to trend downwards.

**No longer functioning:** 65°C. This is indicated by the graph reaching 0% for oxygen production.

[4 marks]

1 mark for identifying that the enzyme is denatured at 45°C.

1 mark for linking the downward trend in the graph to the enzyme denaturing.

1 mark for identifying that the enzyme is no longer functioning at 65°C.

1 mark for linking the graph reaching 0% to the enzyme no longer functioning.