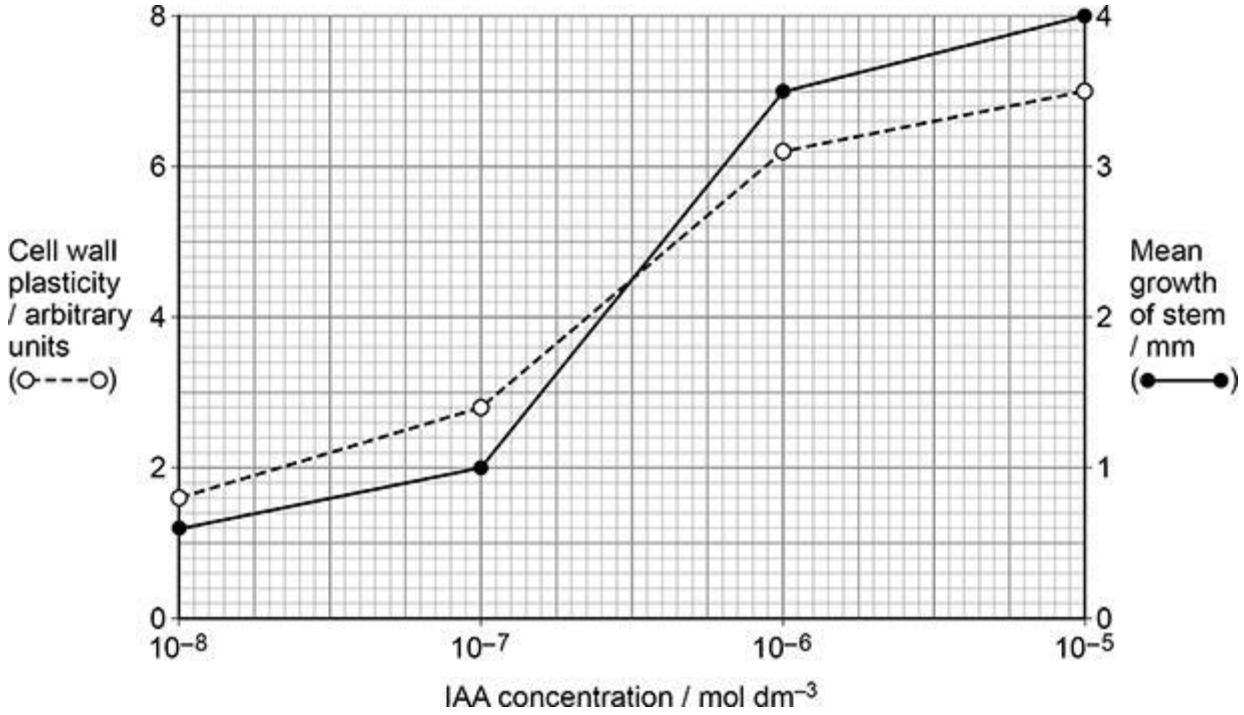
Name of the Student:_____
Max. Marks : 21 Marks **Time : 21 Minutes**

Q1.

Plant cells are surrounded by a rigid cell wall. Cell wall plasticity refers to the ability of a cell wall to stretch permanently. IAA is a growth factor which can activate enzymes that loosen the cell wall.

Scientists investigated the effect of IAA concentration on cell wall plasticity and the growth of stem segments.

The graph below shows some of the scientists' results.



(a) Use the information provided to explain the relationship between IAA concentration, cell wall plasticity and mean growth of the stem segments.

_____

_____

_____

_____

_____

_____

(2)

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(b) Use the graph above to calculate the percentage increase in mean growth of the stem segments when the IAA concentration was increased from 10^{-8} mol dm^{-3} to 10^{-5} mol dm^{-3}

Give your answer to 2 significant figures.

Show your working.

Answer _____ %

(2)

Gibberellic acid (GA) is another plant growth factor. A student was asked to design and carry out an investigation into the effect of different concentrations of GA on the growth of stem segments.

The student was provided with:

- 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4} and 10^{-5} mol dm^{-3} concentrations of GA solution
- distilled water
- 6 Petri dishes and access to glassware
- 60 stem segments of different lengths.

(c) A technician produced the different concentrations of GA solution from a stock 10^{-1} mol dm^{-3} concentration of GA.

Describe how the technician produced the 10^{-3} mol dm^{-3} solution.

_____

_____

_____

(1)

(d) Describe a suitable procedure the student could follow to investigate the effect of different concentrations of GA on the growth of stem segments.

In your answer, you should include the variables that should be controlled in this investigation.

_____

_____

_____

_____

_____

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(5)
(Total 10 marks)

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Q2.

(a) Glutamate is a neurotransmitter involved in the transmission of nerve impulses from pain receptors to the brain. Ziconotide is a drug that can reduce severe, constant pain. Ziconotide blocks the calcium ion channels at some of the synapses which use glutamate.

The transmission of glutamate at synapses is similar to that of acetylcholine.

Explain how ziconotide reduces severe, constant pain.

_____

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(5)

Ziconotide is a polypeptide and acts on synapses in the spinal cord. Scientists investigated the effectiveness of ziconotide in reducing severe, constant pain.

Ziconotide was injected into each patient's cerebrospinal fluid that bathes the brain and spinal cord. Patients recorded the intensity of their pain using a statistically valid scale.

(b) Suggest **two** reasons why the patients had ziconotide injected into their cerebrospinal fluid rather than taking a pill containing the drug.

1 _____

_____

2 _____

_____

(2)

(c) Ziconotide was injected at 3 ng kg^{-1} h^{-1} for 8 days into each patient.

1 ng = 1×10^{-9} g

Calculate the total mass in grams of ziconotide injected after 8 days into a patient with a body mass of 82 kg

Show your working.

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Answer _____ g

(2)

(d) When the patients recorded the intensity of pain, suggest **two** reasons why it was important to use a statistically valid scale.

1 _____

_____

2 _____

_____

(2)

(Total 11 marks)

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