

# 9.3 Growth in Plants

## Question Paper

Course	DP IB Biology
Section	9. Plant Biology (HL Only)
Topic	9.3 Growth in Plants
Difficulty	Hard

**Time allowed:** 10  
**Score:** /5  
**Percentage:** /100

## Question 1

Meristem cells at the tip of a growing shoot differentiate into specialised cells as the shoot grows, forming stems and other differentiated plant tissues e.g. ground tissues.

Which of **A – D** best explains why there is always a number of meristem cells in a shoot apex even as the shoot grows?

- A. The coleoptile (early shoot) contains enough meristem cells to provide for a juvenile plant to grow into a fully-grown plant.
- B. Mitosis in the shoot tip results in 2 daughter cells, one of which remains meristematic while the other cell differentiates.
- C. Mitosis in the shoot tip results in 4 daughter cells, two of which remain meristematic while the other two differentiate.
- D. The action of plant hormones reverses the effects of differentiation on certain cells, turning them back into meristem cells.

[1 mark]

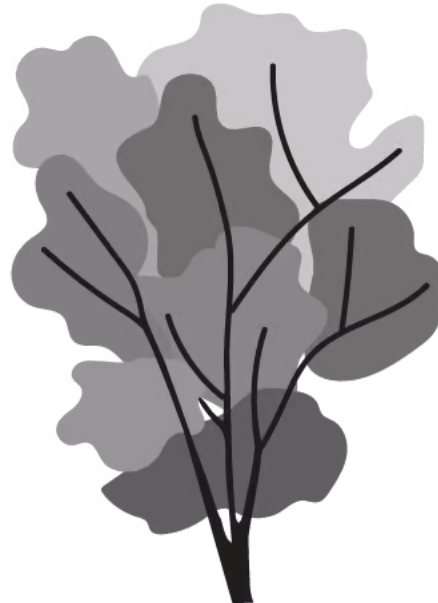
## Question 2

The image below shows two tree species native to North America.

The Jeffrey pine (*Pinus jeffreyi*) typically grows to 45m height at maturity, whereas the silver maple (*Acer saccharinum*) would only grow to 25m.



Jeffrey pine



Silver maple

Which table would be the best choice for predicting the levels of indole-3-acetic acid (IAA) at two parts of a typical growing shoot of these two trees?

A.		<b>Jeffrey pine</b>	<b>Silver maple</b>
	<b>At shoot apex</b>	High	High
B.	<b>At first axillary bud</b>	Low	High
		<b>Jeffrey pine</b>	<b>Silver maple</b>
C.	<b>At shoot apex</b>	High	Low
	<b>At first axillary bud</b>	High	Low
D.		<b>Jeffrey pine</b>	<b>Silver maple</b>
	<b>At shoot apex</b>	Low	High
	<b>At first axillary bud</b>	High	Low
		<b>Jeffrey pine</b>	<b>Silver maple</b>
	<b>At shoot apex</b>	High	Low
	<b>At first axillary bud</b>	High	High

[1 mark]

### Question 3

Which of **A – D** gives the most accurate description of how efflux pumps contribute to plant tropisms?

- A. Efflux pumps pump low-density particles to the top of a horizontal root in order to initiate a positive gravitropism.
- B. Light denatures PIN3 proteins which leads to fewer efflux pumps, and hence less cell elongation, on the sunny side of a plant shoot.
- C. Efflux pumps are coded for by PIN3 genes and carry auxins from one cell to another in order to maintain an uneven distribution of auxins.
- D. Efflux pumps carry auxins away from growing tissues on the removal of a stimulus, in order to maintain an even distribution of auxins.

[1 mark]

### Question 4

Which of the following statements apply to the use of microarrays in the study of plant growth?

- I. A microarray is used to ascertain whether a gene is being expressed or not.
- II. RNA in the tissue sample binds to short DNA probes by covalent bonding.
- III. The DNA probes carry a radioactive marker and can be visualised when they bind to a piece of transcribed RNA.
- IV. Microarrays can reveal phenotypic traits that are not necessarily easily observable in an experiment.
- V. Microarrays will only display if a gene is being transcribed at the exact time of analysis.

- A. I, IV and V
- B. III, IV and V
- C. All of them
- D. I, III, IV and V

[1 mark]

### Question 5

The plant tissue cambium gets its name from the word *cambio*, which in Spanish means 'change'.

Which of **A – D** gives the best explanation for cambium tissue having this name?

- A. Cambium can change its function from day to day depending on the requirements of the plant.
- B. The direction of flow in cambium vessels can change according to the needs of the plant at a particular time of day, or with weather fluctuations.
- C. Cambium can change, by differentiation, into xylem or phloem tissues as the plant grows.
- D. Cambium has the ability to change the tropism responses of a plant's shoots and roots in response to external stimuli.

[1 mark]