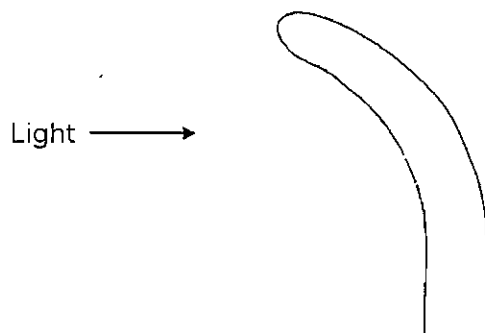


Year 11 Biology SAC (2008): Plant tropisms.

Name: TEACHER

Question 1. A biologist conducted an experiment on straight wheat seedlings that were exposed to light from one side. After 48 hours, the seedlings had bent as shown in the diagram below.



Give answers to the following:

- a. Name the hormone that brings about this response. auxin (1 mark)
- b. What is the stimulus in this experiment? light (1 mark)
- c. What part of the seedling detects this stimulus? shoot tip (meristem) (1 mark)
- d. Explain how the hormone that you referred to in Part (a) brings about the response shown (2 marks)

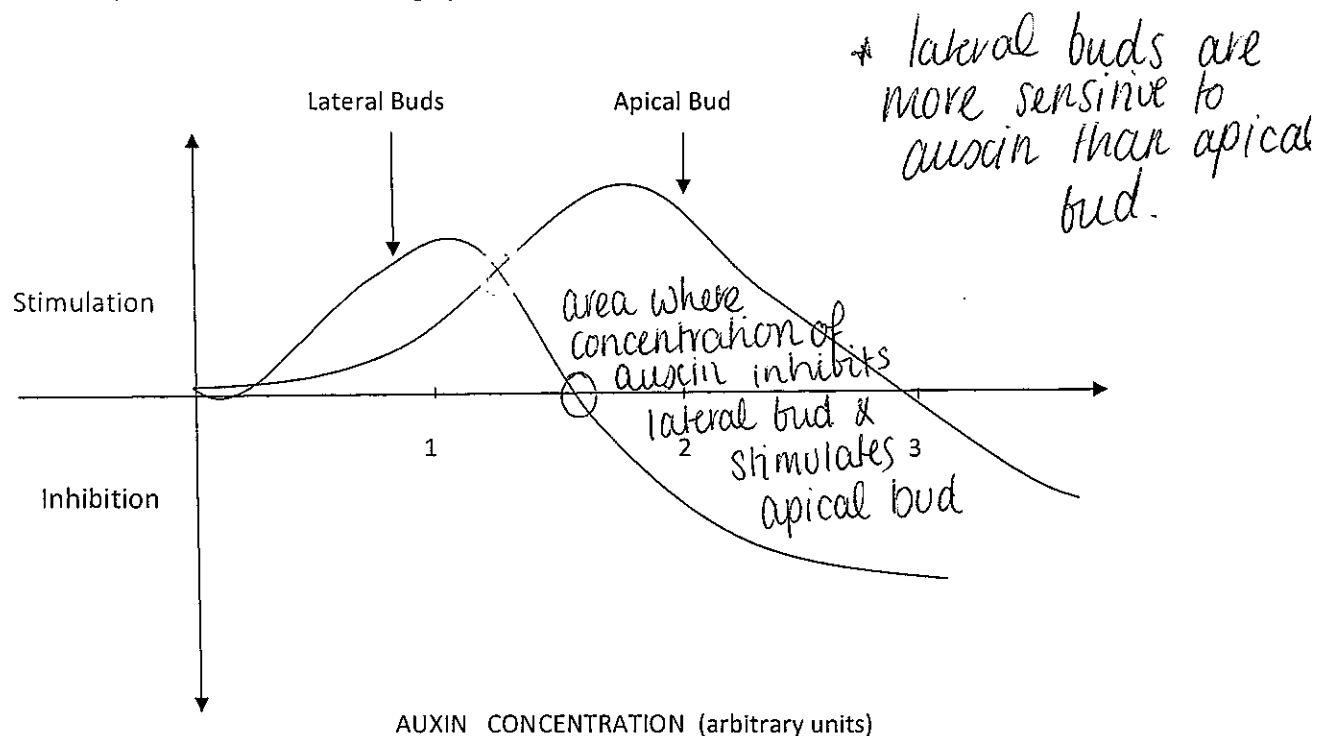
light interacts with receptors that control the membrane permeability to auxin, so that auxin moves laterally away from the light. This results in a higher concentration of auxin on the dark side of the tip which then grows on the dark side at a faster rate than the light side causing the tip to bend towards the light.

Question 2. Apical dominance refers to the stimulation of growth of the bud at the apex (top) and inhibition (blocking) of the growth of the lateral (side) buds of a plant. This causes the plant to grow quickly upwards, rather than develop side branches.

- a. Why might it be advantageous for a plant to display apical dominance. Explain your answer (2 marks)

results in a taller plant with fewer side branches, which is better for competition in forests etc.

Apical dominance is believed to be caused by the production of auxin in the apical bud which is then transported to the lateral buds, blocking their growth. Lateral buds and apical buds respond differently to auxin as shown in the graph below.



- b. Indicate a concentration of auxin at which the apical bud is stimulated and the lateral buds are inhibited.

1.5 (1 mark)

- c. By referring to this graph and the information given, explain why the removal of the apical bud results in the lateral buds being stimulated to grow. (3 marks)

When the apical bud is removed, the source of auxin is removed. Since the auxin concentration is much lower, the lateral buds can now grow. In fact their growth will now be stimulated by a relatively small drop in auxin concentration.

Question 3. The brown spots on a banana produce large amounts of ethylene. Ethylene is a plant hormone.

a. What is a hormone? (1 mark)

chemicals released by cells - chemical messenger

b. Describe a difference between plants and animals in relation to hormonal control. (1 mark)

plants have no endocrine system, hormone producing cells in plants are not organised into glands. plant hormones are produced by cells that receive the stimulus... plants much slower, through xylem, phloem or air

c. What effect would ethylene have on other fruits, such as apples and tomatoes? (1 mark)

because there is not muscular system to aid their release or transport.

d. Why are plant hormonal responses much slower than those in animals? (1 mark)

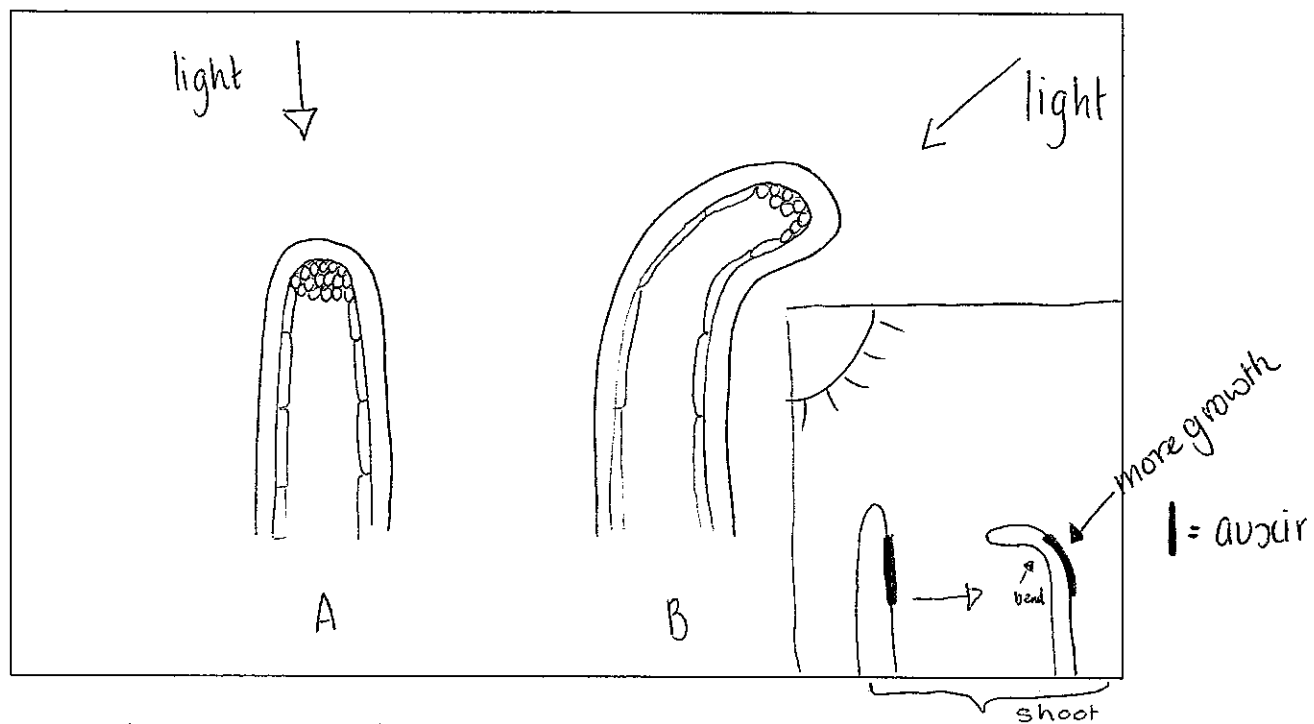
ripening of fruit

Delphiniums are flowers that are grown commercially and sold to florists. They are prone to dropping their petals when they are stored with other flowers at a florist shop. This makes them worthless. However, commercial growers of Delphiniums often apply a spray containing silver thiosulphate to prevent the flowers from dropping their petals.

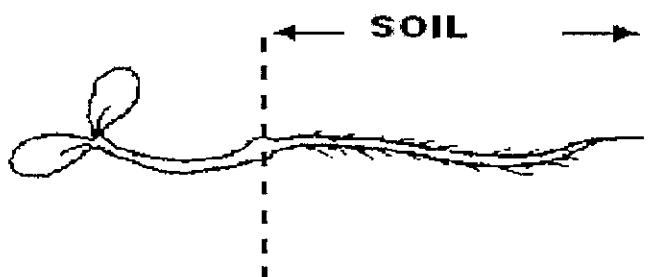
e. Suggest how silver thiosulphate prevents Delphiniums from dropping their petals. (2 marks)

silver thiosulphate delays or inhibits the effects of ethylene on the delphiniums and therefore delays petal drop, senescence, ripening.

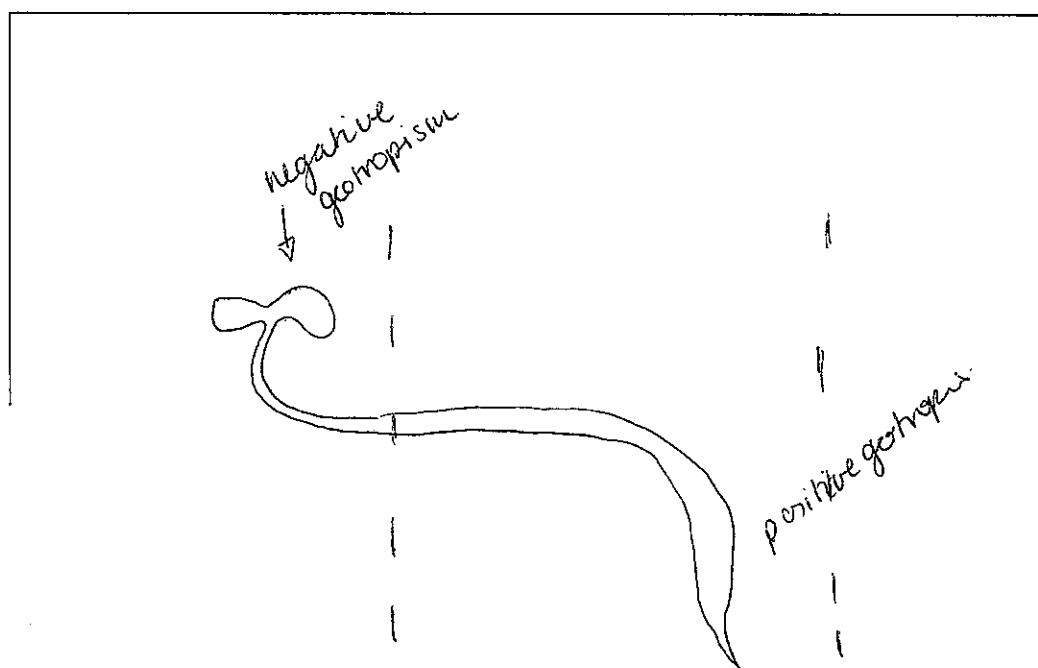
Question 4. Explain using simple annotated diagrams, how auxins cause the bending of a shoot toward the light? (3 marks)



c. In another experiment, a student germinated a seedling and then placed the seedling in a horizontal position in the dark. See diagram below.



In the box below, draw how the seedling would look after a few days of growth. In your drawing, indicate where positive geotropism has occurred and where negative geotropism has occurred. (2 marks)



- d. Hormones are produced naturally by plants, while **plant growth regulators** are applied to plants by humans. These can be either naturally occurring or synthetic.

1. Why would humans develop synthetic plant growth regulators? (1 mark)

to either promote or inhibit plant growth
(control)

2. Give one example of where the use of a plant growth regulator would be beneficial? (1 mark)

control of weeds, leaf fall, ripening of fruit, stimulate root formation for cuttings.
production of seedless fruit.