

Plant hormones

Revision notes · How auxins control phototropism and gravitropism, and the commercial uses of auxins, gibberellins and ethene.

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Plant hormones Spec 6.15B–6.16B Triple only

Plant hormones, phototropism and gravitropism Spec 6.15B

Plant hormones are chemicals that **control and coordinate** plant growth and development. They are made in one part of the plant and move to other parts, where they change how cells grow.

A **tropism** is a growth response to a stimulus. A growth towards the stimulus is positive. A growth away from the stimulus is negative. **Auxins** are the plant hormones involved in two tropisms:

- **Phototropism**: growth in response to light.
- **Gravitropism**: growth in response to gravity.

Auxins in shoots

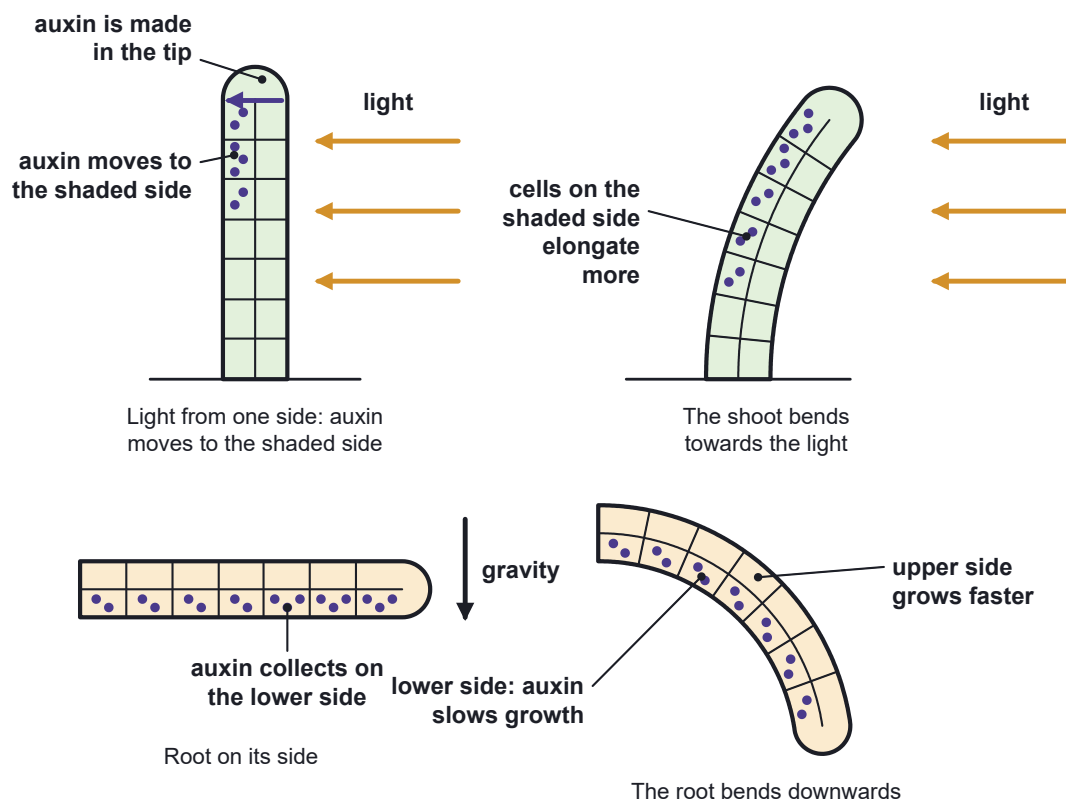
1. Auxin is made in the tip of the shoot.
2. When light shines from one side, auxin moves to the shaded side of the shoot.
3. In shoots, auxin makes cells elongate (get longer), so the cells on the shaded side grow faster.
4. The shoot bends towards the light. Shoots are positively phototropic.

If a shoot is lying on its side, auxin collects on the lower side. The cells there elongate more, so the shoot bends upwards, away from gravity. Shoots are negatively gravitropic.

Auxins in roots

Roots respond differently to auxin. In a root that is lying on its side, auxin collects on the lower side, where it slows the growth of the cells. The cells on the upper side grow faster, so the root bends downwards, in the direction of gravity. Roots are positively gravitropic. Roots also grow away from light, so they are negatively phototropic.

Tropisms of shoots and roots		
	Response to light	Response to gravity
Shoot	Positive phototropism (grows towards light)	Negative gravitropism (grows upwards)
Root	Negative phototropism (grows away from light)	Positive gravitropism (grows downwards)



Shoots: auxin makes shaded-side cells **elongate**, so the shoot bends towards light. Roots: auxin on the lower side **slows growth**, so the root bends down.

Exam tip: Tell the story in order: where auxin is made, where it moves to, what it does to cell growth there, and which way the plant bends as a result.

Commercial uses of plant hormones Spec 6.16B

Growers and farmers use plant hormones, or chemicals that act like them, to control how plants grow.

Commercial uses of auxins, gibberellins and ethene		
Hormone	Use	Effect
Auxins	Weedkillers	Selective weedkillers make broad-leaved weeds grow too fast and uncontrollably, which kills them. Narrow-leaved crops such as cereals are not affected.
Auxins	Rooting powders	Cuttings dipped in the powder grow roots quickly, so new plants can be produced
Gibberellins	Germination	Used to end seed dormancy and make seeds germinate
Gibberellins	Fruit and flower formation	Used to make flowers and fruits develop
Gibberellins	Seedless fruit	Fruits form without being fertilised, so they contain no seeds
Ethene	Fruit ripening	Unripe fruit is picked, transported, and then ripened using ethene when it is needed

Exam tip: Learn every use in the table: two for auxins, three for gibberellins and one for ethene. A good answer states the hormone, the use and the effect.

Quick check

- 1 . What is a tropism?
- 2 . Which hormone is involved in phototropism and gravitropism?
- 3 . Why does a shoot bend towards light?
- 4 . Are roots positively or negatively gravitropic?

Quick check answers

Plant hormones

1. A growth response of a plant to a stimulus.
2. Auxin.
3. Auxin moves to the shaded side and makes those cells elongate more, so that side grows faster.
4. Positively gravitropic: they grow downwards, in the direction of gravity.