PLANT COORDINATION

- Plants can respond to a stimulus such as light by growing towards it. These are called plant tropisms.
- Tropisms may be positive (e.g. roots growing towards earth's gravity) or negative (e.g. shoots growing away from earth's gravity).
- Plant coordination is by means of plant hormones that are produced in meristematic tissue such as cambium and travel either from cell to cell or in phloem.
- Names of some common hormones are auxins, cytokinins, gibberellins, abscisic acid and ethylene.

PLANT RESPONSE	DESCRIPTION
Phototropism	Growth towards light
Geotropism	Growth of root towards earth's gravity, and growth of shoot away from earth's gravity
Thigmotropism	Response to touch (e.g. closing of leaves of *Mimosa pudica*, ivy vines that cling to walls, trapping of insect by Venus Flytrap)
Elongation of shoots	Elongation of cells in stems
Abscission of leaves	Falling of leaves particularly in autumn
Photo-periodism	Flowering of many plants stimulated by continuous periods of night

Refer to diagrams showing phototropism experiments, abscission and flowering in your textbook.

Auxins

- Auxins are plant hormones produced in the shoot tip (coleoptile). They travel through layers of cells rather than the phloem and are very concentrated along the dark side of the shoot away from the light. Those cell walls soften and the cells elongate, causing the stem to bend towards the light.
- Auxins are also involved in regulating the growing of plant shoots upwards against the action of gravity (negative geotropism). Auxins concentrate on the lower part, causing the plant shoot to grow upwards.
- Auxins produced in the tips of a plant also affect the lateral or branching growth of a plant. The more auxin that is concentrated in the tip, the shorter are the side-branches. This is known as apical dominance. Gardeners encourage branching and bushiness of plants by snipping the tips of branches.

Cytokinins

- In association with auxins, cytokinins stimulate cell division and differentiation in plant cells.

Gibberellins

- Gibberellins promote growth of the entire plant by elongating cells and promoting cell division. They are also responsible for flowering in some plants, enlargement of fruit amd seed germination.

Abscisic Acid

- Abscisic acid is responsible for the growth of roots towards the centre of the earth (positive geotropism).
- Abscisic acid is alo responsible for abscission which is the dropping of leaves or fruit. Dicotyledons have leaves with both petiole (stalk) and blade. An area of weakness grows across the base of the stalk. Eventually only the veins remain holding the stalk. The chlorophyll in the leaves breaks down, leaving the presence of other yellow pigments. The leaves then fall easily in wind. A similar process occurs with fruit.

Ethylene

- Ethylene is a gas released by ripening fruits, and stimulates further fruit ripening.
- The production of ethylene is stimulated by auxins and abscisic acid.

Hormones controlling Photoperiodism

- The time at which a flower forms is controlled by various hormones.
- The photoperiod is the number of hours a plant is exposed to light. However, it is the increasing or decreasing number of hours of continuous darkness that stimulates the flowering in many plants.
- Examples of flowering plants that flower when continuous darkness is more than 14 hours are chrysanthemums (Mother's Day flowers), poinsettias and potatoes.
- Examples of flowering plants that flower when continuous darkness is less than 14 hours are clover, beets, corn and gladiolus.
- Carnations, cotton, dandelions, sunflowers and tomatoes are examples of plants that flower all year round.