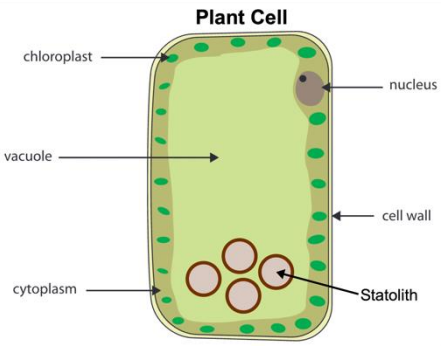
**CONCEPT:** TROPISM

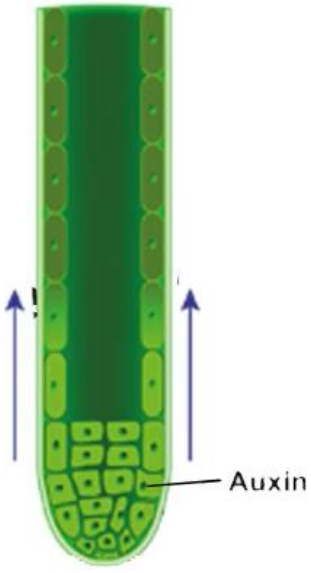
- ***Gravitropism*** – growth or movement in response to gravity, found in both roots and shoots
- Statolith hypothesis – statoliths are denser than water, and will sink to the bottom of cells, activating sensory signals
    - □ ***Statolith*** – dense, starch-filled organelle used in detecting gravity
        - Amyloplasts – organelle containing starch granules
    - □ Cells in the root cap contain statoliths, respond to gravity, and induce a gravitropic response

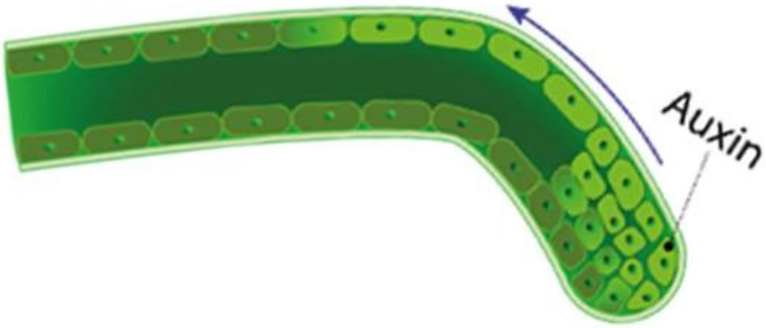
**EXAMPLE:**




- Auxin distribution in the root may also influence gravitropism
    - □ Auxin is distributed evenly in a vertical root, but will have an uneven dispersion otherwise
    - □ Growth in the root will vary based on auxin concentration, causing bending of the root towards gravity

**EXAMPLE:**



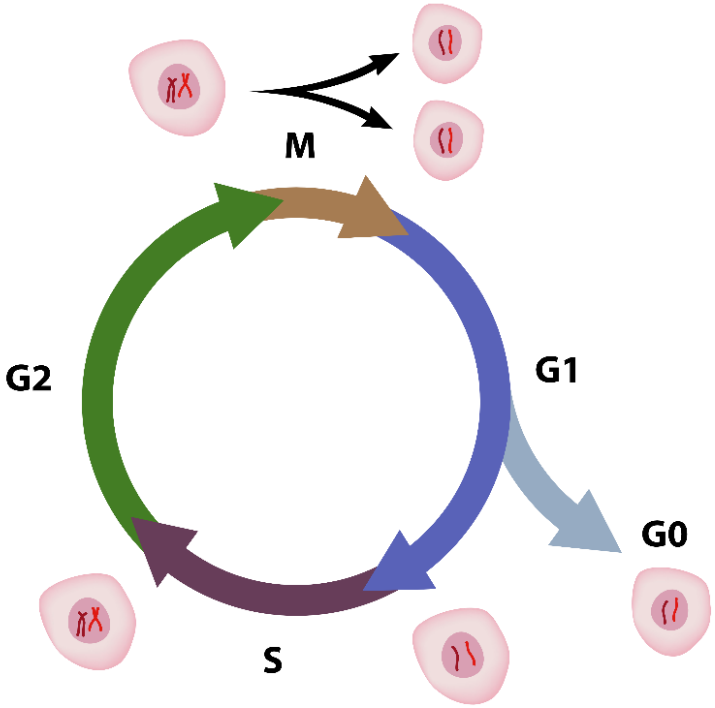
**CONCEPT:** TROPISM

- ***Thigmotropism*** – growth or movement in response to physical stimulus, like touch or wind
  - □ Climbing plants use tendrils to feel for surfaces to grapple
  - □ Venus fly trap can shut closed on an insect in under a second
  - □ ***Action potential*** – electrical signal carried by the movement of ions across a membrane
    - Plants conduct action potentials via plasmodesmata

**EXAMPLE:**

- ***Cytokinins*** – hormone that regulates cell cycle, causing cells to pass the G2 checkpoint and continue dividing
  - □ Produced in the roots, and transported through xylem to target tissues
  - □ Ratio of cytokinins to auxin plays a role in apical dominance and growth

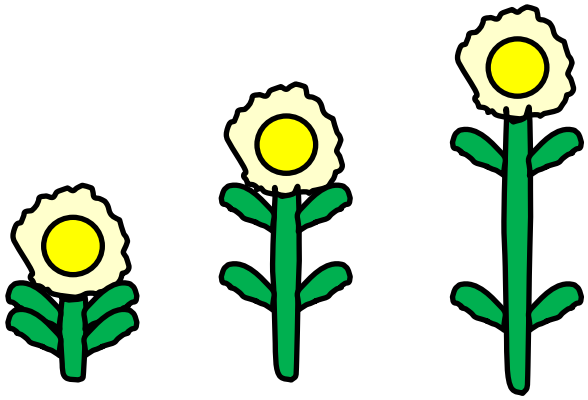
**EXAMPLE:**

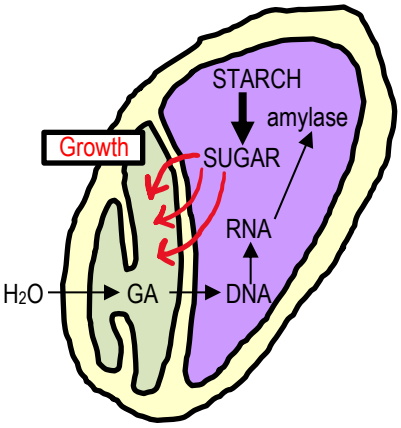


**CONCEPT:** HORMONES

- ***Gibberellins*** – class of plant hormones that regulate growth
    - □ Involved in stem elongation, fruit growth, and seed germination
- ***Abscisic acid*** (ABA) – hormone involved in stomata opening and seed dormancy
- ***Dormancy*** – period of arrested growth prior to germination that will end given the right stimuli and conditions
    - □ ABA thought to inhibit germination, and gibberellins thought to induce germination
- ***Brassinosteroids*** – class of plant hormones that are involved in cell elongation and division
    - □ Help regulate plant body size

**EXAMPLE:**






- ***Senescence*** – biological aging marked by gradual deterioration of function
    - □ ***Ethylene*** – gaseous hormone closely associated with senescence in plants
    - □ ***Abscission***- shedding of part of an organism, plants leaves are abscised during the fall
        - Cells in the petiole react to ethylene, enzymes degrade cell walls
    - □ Fruits ripen when exposed to ethylene, starch is converted to sugar, cell walls are broken down

**EXAMPLE:**