**2.3 – Plant and Animal Cellular Processes *(Notes)***

* Cells perform many functions in order to survive.
  + Transfer – cells transfer small molecules (oxygen and carbon dioxide) and larger molecules (proteins) across their membranes.
  + Reproduce and synthesize proteins
  + Maintaining proper functionality – through carrying out thousands of chemical reactions
  + Energy supply – Photosynthesis (plant), aerobic respiration (animals)
* Regardless of what you are doing (sitting, standing, awake, asleep, playing soccer, having dinner at a friend’s house etc.) your cells are busy places.
* Just like a busy factory materials are arriving in your cells, being used in production and the waste and final products are being transported out.
* The materials entering a cell through diffusion and osmosis and other transport mechanisms are raw materials to be used by the various organelles.
* These organelles are breaking materials down in order to:
  + convert energy
  + transport energy
  + build proteins
  + send chemical messages
* Cells also regularly expel tiny amounts of waste.
* Multicellular organisms expel waste proportional to their mass.
* Transforming energy
  + All cellular activities (growth, repair and reproduction) need energy.
  + Cellular respiration (animals)- Mitochondria provide energy for the cell by transforming oxygen and sugar (food) into carbon dioxide and water.
  + Photosynthesis (plants) –
    - Chlorophyll in the chloroplast captures the Sun’s energy
    - Chloroplast uses this energy to convert the carbon dioxide and water into oxygen and sugar.
    - Energy is transformed from sunlight into sugar in plants
    - Chloroplasts produce the sugar needed by the mitochondria in this process.
  + As an outcome of photosynthesis, sugar can now be consumed to release usable energy in both plant and animal cells (cellular respiration).
* Processing and transporting Materials
  + Water, gases and nutrients enter cells through the cell membrane
  + Materials move through the cytoplasm to the various organelles
  + Endoplasmic reticulum – Makes proteins from raw materials that come into the cell and passes them to the golgi apparatus.
  + Golgi apparatus – Processes protein molecules and secretes them outside the cell to be used elsewhere in the organism.
  + Lysosomes – Breaks down food and digests waste.
  + Nucleus – Controls all of the cells activity
* Reproducing
  + Cells have a life span
    - Cells die because they have been damaged, not received enough food or water, or because they have reached the end of their life span.
  + Given these losses multicellular organisms should be constantly shrinking.
  + But this is not the case because before the cells die they create a replacement for themselves through cell division.
  + Cell division for animal cells (p.52, Fig. 2.34) – Cell splits in half to create two smaller cells.
    - The nucleus splits first and then the membrane begins to pinch near the middle to divide the cytoplasm, including its organelles.
    - Then the rest of the cell divides completely.
  + Cell division for plant cells (p.53, Fig. 2.35) –
    - The nucleus divides
    - Then instead of pinching in half a new cell plate develops across the cell to create a new cell wall between the two nuclei.