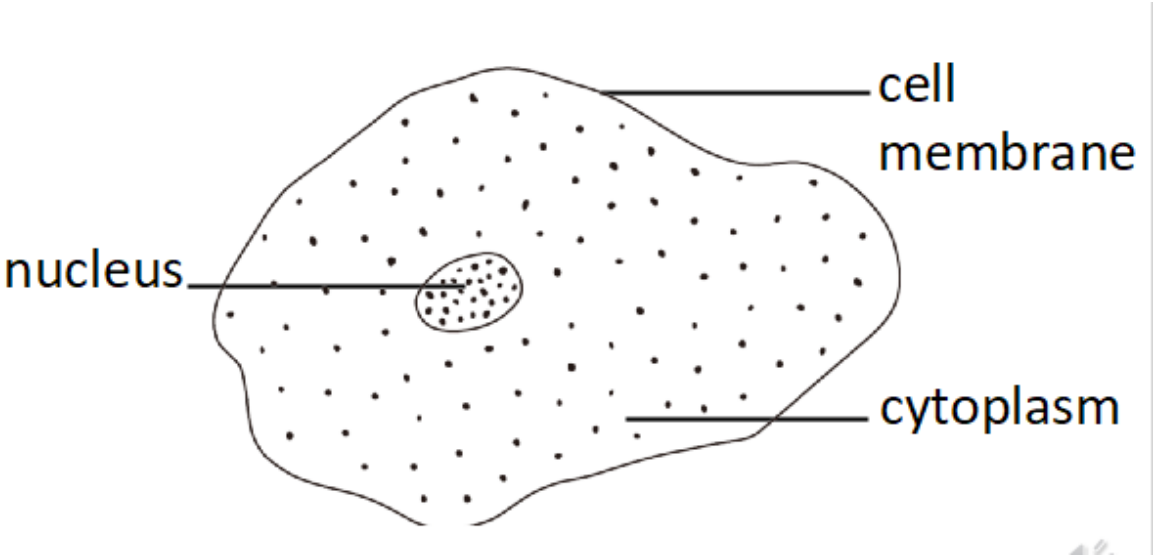
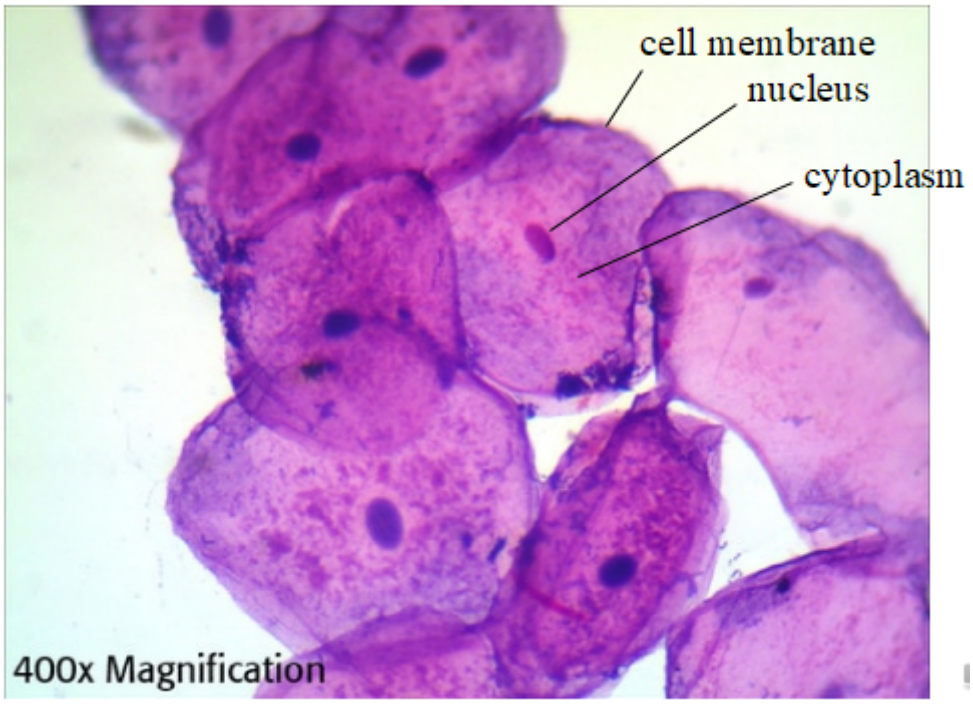
4.1 cells

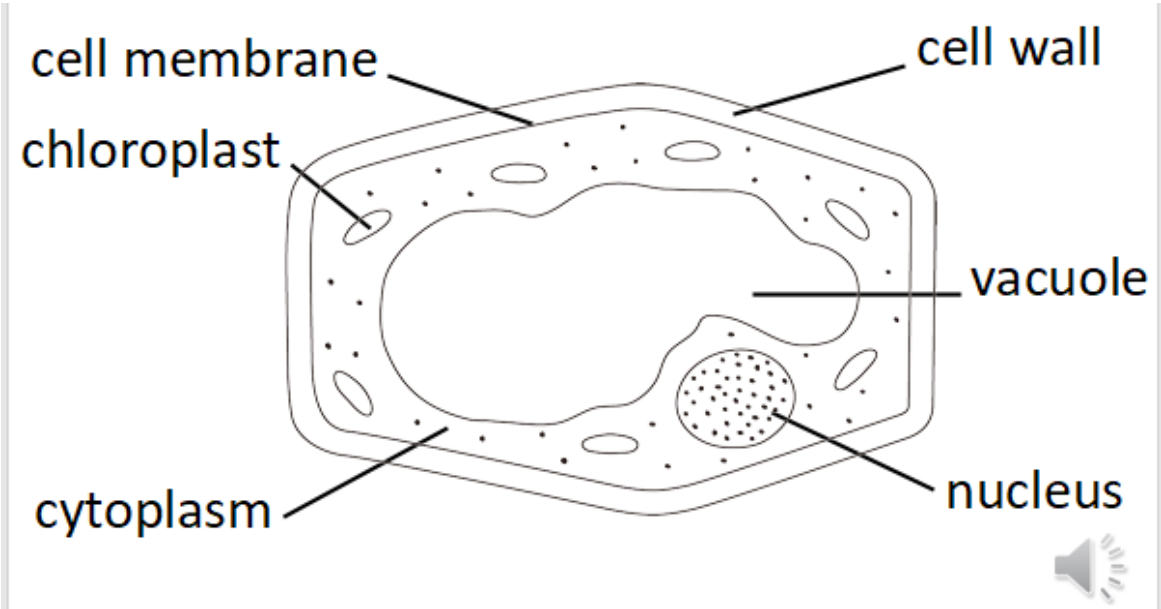
- basic unit of living things
  - all living things are made up of cells.
    - made up of 1 cell only
      - called unicellular organisms
    - made up of 2 or more cells
      - called multicellular organisms
- basic structures of cells
  - animals cells
    - cell membrane
      - Each animal cell is surrounded by a thin layer
    - cytoplasm
      - Inside the membrane is a jelly-like substance
    - nucleus
      - Surrounded by cytoplasm
    -



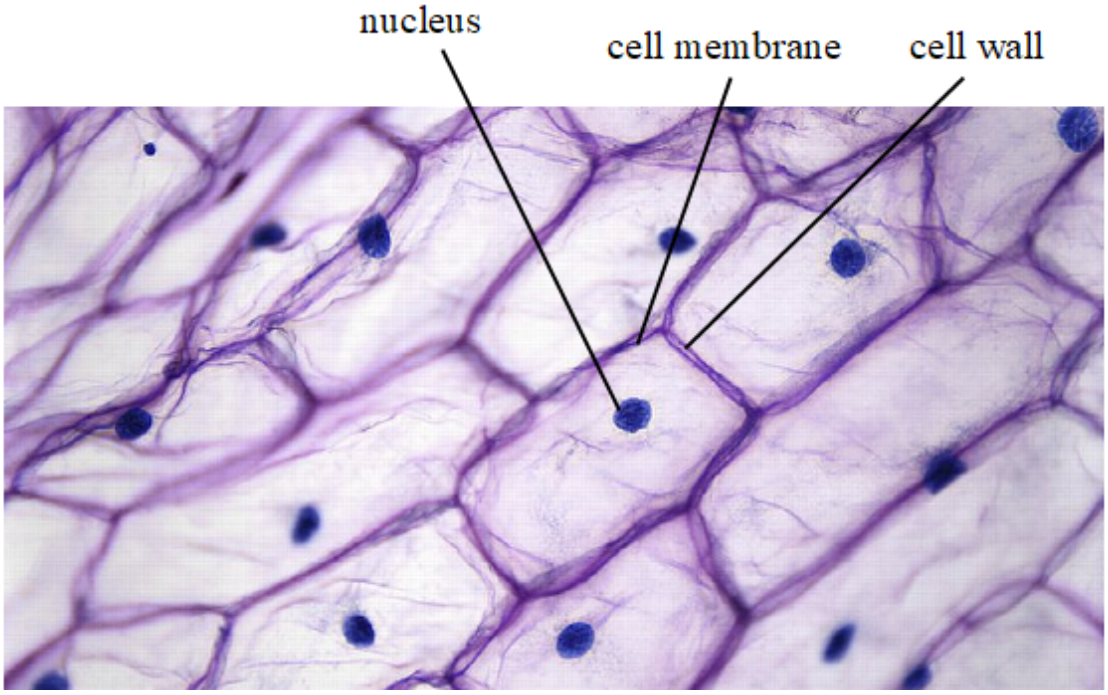
    -



- plant cells
  - also consists of a cell membrane, a nucleus and cytoplasm
  - cell wall
    - plant cell has a rigid cell wall outside the cell membrane.
  - vacuole
    - There is usually a large vacuole in the cytoplasm.
  - chloroplasts
    - Some cells in green plants also contain chloroplasts.
  -

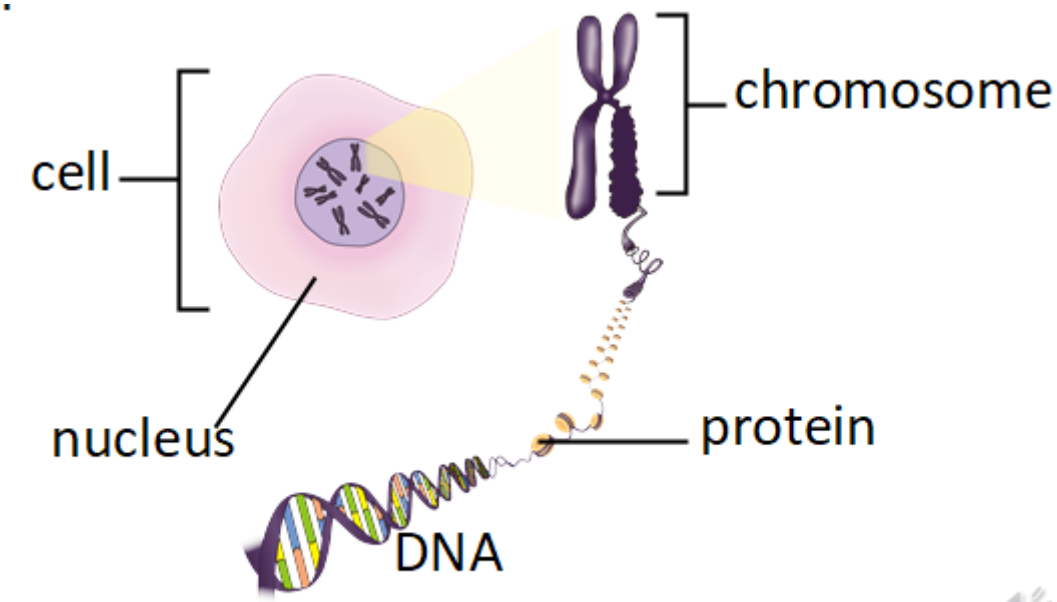


  -

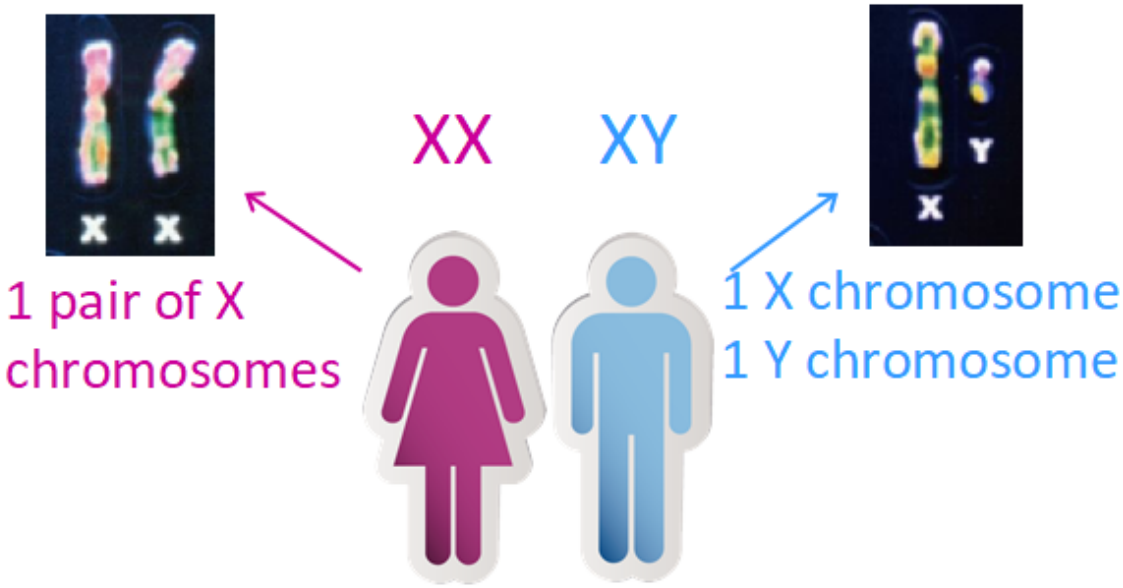


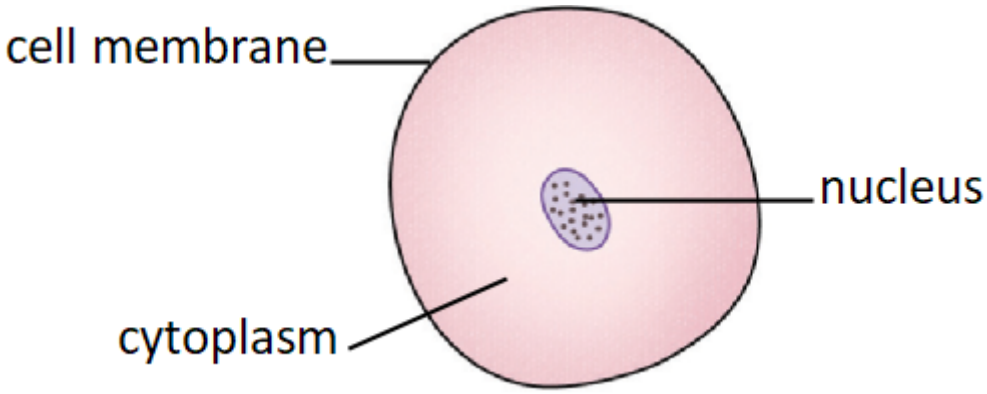
- Functions of the basic structures of cells
  - Cell membrane
    - Present in both animal cells and plant cells
    - Controls the movement of substances into and out of the cell
  - Nucleus
    - Present in both animal cells and plant cells
    - Contains genetic materials which control the activities of the cell
  - Cell wall
    - Present only in plant cells
    - Protects, supports and gives shape to a plant cell
  - Cytoplasm
    - Present in both animal cells and plant cells
    - The medium where chemical reactions take place
  - Vacuole
    - Present only in plant cells
    - Contains mainly water and stores dissolved minerals
  - Chloroplast
    - Present only in plant cells
    - Site where photosynthesis takes place in order to make food
- Observing cells with a microscope
  - The microscope
    - light microscopes

        - Can magnify the image of an object by up to a few hundred times
    - electron microscopes
        - Can magnify the image of an object by up to several million times
- Genetic materials inside the nucleus of a cell
    -
        - DNA (deoxyribonucleic acid)
            -
                - the genetic materials inside the nucleus
            - contains all instructions needed for the cells to function, grow and reproduce
                - determines what features we receive from our parents
    - Chromosomes and DNA
        - DNA
            - The DNA coils up and wraps around the proteins
                - DNA coiled around proteins in the nucleus of an animal cells
        - Chromosomes
            - Inside the nucleus of a cell, there are thread-like structures
            - made up of DNA and protein in the nucleus of an animal cells
            - in the nucleus of an animal cells
        -

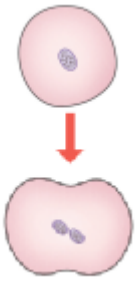


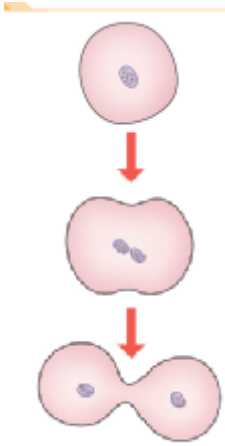
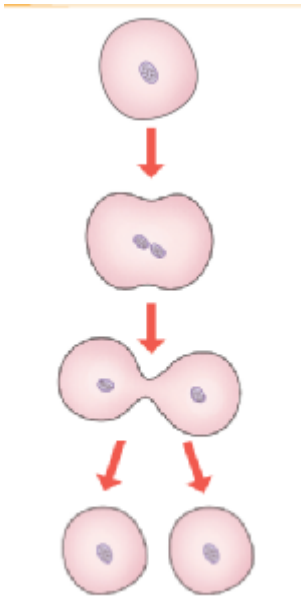
- Chromosomes in human body cells
    - Every cell in the human body contains 23 pairs of chromosomes or 46 chromosomes
    - There are 22 pairs of autosomes and one pair of sex chromosomes.

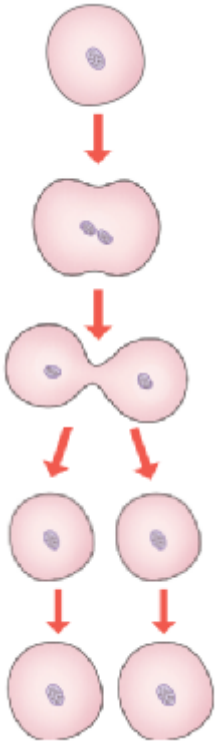
- 

- Cell division and growth
  - cell division
    -
      - When living things grow, the number of cells in their bodies increases by cell division.
    - step 1
      - Before cell division, the genetic materials in the nucleus of the parent cell make an identical copy of themselves.
      - 

    - step 2
      - The nucleus divides into two.
      -



- step 3
  - The cytoplasm divides into two.
  - 
- step 4
  - Two new cells called daughter cells are formed, each containing a nucleus.
  - 
- step 5
  - The daughter cells absorb nutrients and grow bigger.
  -



- When the daughter cells reach a certain size, they may divide again.
- As a result of repeated cell divisions and the increase in size of cells, living things grow bigger.