Cell Cycle Notes

**Why can’t cells just get larger and larger?**

* : The larger a cell becomes, there is a higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ placed on the cell’s DNA.
* The cell has more trouble \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ enough nutrients and wastes across the cell membrane as quickly as it needs to.
* As the cell’s volume increases, the surface area increases at a rate.

**Solution to cell growth issues:**

* Cell division.
  + This creates two “\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” cells
  + DNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ before division to insure that each daughter cell gets one complete set of genetic information
  + Problem of DNA overload and nutrient/waste exchange is solved.

# Cell Division

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (cells without a nucleus) – simple matter of separating the contents of the cell into two parts 🡺 .
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (cells with a nucleus) – more complex and occurs in two main stages

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - division of cell nucleus
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - division of cytoplasm

* Mitosis is considered reproduction because there is only set of DNA involved.
* Why is mitosis necessary?
  + , , and .

**How do cells know what to do?**

* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ information in a cell is stored in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - made up of \_\_\_\_\_\_\_\_\_\_\_\_\_
* Each chromosome must be replicated before cell division. After replication, each chromosome consists of two identical “sister” \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_held together by a centromere.
* Draw an unreplicated chromosome. Draw a replicated chromosome (label)
* Every organism has a specific number of chromosomes
  + Ex. Humans 46, fruit flies 8, carrot cells 18
  + They are only visible during . They are called chromatin when uncoiled.
* Sex cells ( ) are (n) = set of chromosomes.
* Body ( ) cells are (2n) = set of chromosomes.

**The Cell Cycle**

* During the cell cycle, a cell , for division, and to form two daughter cells, each of which then begins the cycle again.
* It consist of \_\_\_\_\_ phases (stages)
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - “in between”phase. Period of growth and replication.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - Division phases

**Interphase:** **Growth and preparation**

* : Gap 1 phase 🡺 cell and makes copies of organelles and proteins.
* : Synthesis phase 🡺 DNA is .
* : Gap 2 phase🡺 molecules and organelles needed for mitosis are made

**M phase: division**

* Mitosis: division of the .
* Biologists divide the events of mitosis into 4 phases: , , , , and .
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - Longest phase
  + condenses 🡺 chromosomes.
  + Nuclear envelope and nucleolus .
  + - separate and take up position on opposite sides of the nucleus
  + - fanlike microtubule structures appear
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - lasts only a few minutes.
  + Spindle fibers move the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so that they line up across the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of cell.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -
  + Centromeres that join the sister chromatids , separating the sister chromatids into individual chromosomes.
  + are pulled apart towards poles.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - begins once the chromosomes have reached the poles.
  + Chromosomes begin to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into .
  + Nuclear envelope and nucleolus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Spindle fibers apart.
* Cytokinesis- division of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, occurs at the same time as telophase.
  + Pinches inward (in animal cells)
  + Forms 🡺 cell wall (in plant cells)

# What regulates the cell cycle?

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - proteins that regulates the timing of the cell cycle
  + Speed up or slow down process as needed.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ regulators – protein “checkpoints” within the cell
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ regulators – direct cells to speed up or slow down the cell cycle
  + Growth factors and “proximity” sensors

**What happens if something goes wrong?**

* When a cell’s internal or external regulators are “broken” 🡺 can develop.
  + Cell growth 🡺 cells don’t stop dividing and form masses of cells called

.

* Causes: Carcinogens such as , , and .
* A large number of cancers are caused by a defect in the gene.
* How is cancer often treated? Drugs that stop cancer cells from .