

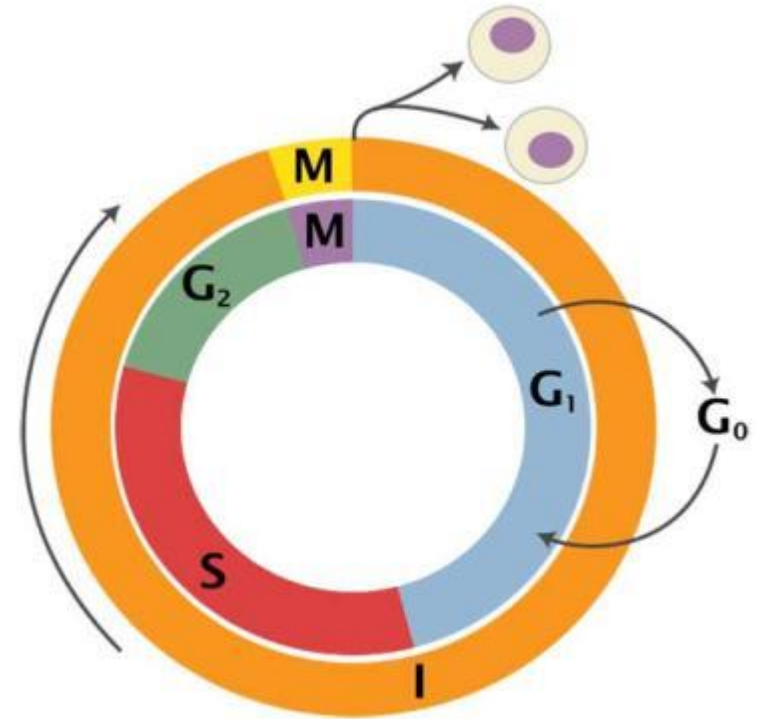
Cell Division

Mitosis & Meiosis

Eukaryotic Cell Cycle

- Cell grows.
- DNA is replicated.
- Mitotic cell division produces daughter cells identical to the parent.
- Repeat.

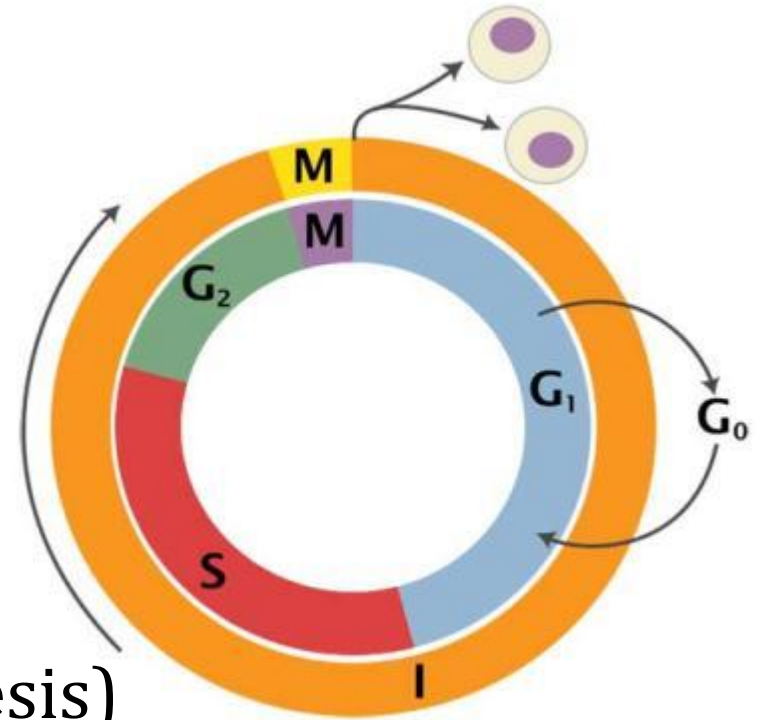
The timing of replication and cell division is highly regulated.

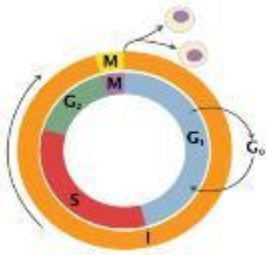


Eukaryotic Cell Cycle

2 major phases:

- **Interphase** (3 stages)
 - DNA is not condensed
- **Mitosis** (4 stages + cytokinesis)
 - Nuclear division & division of cytoplasm
 - DNA condensed





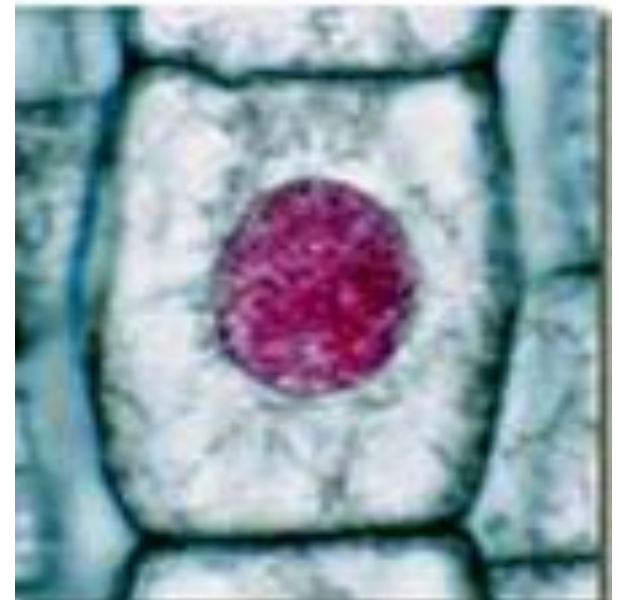
Interphase

**Non-dividing state
with 3 sub-stages:**

Gap 1 – cell grows in size
– organelles replicated

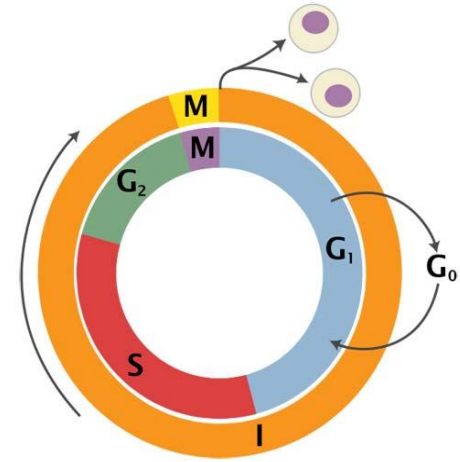
Synthesis – replication of DNA
– synthesis of proteins
associated with DNA

Gap 2 – synthesis of proteins
associated with mitosis



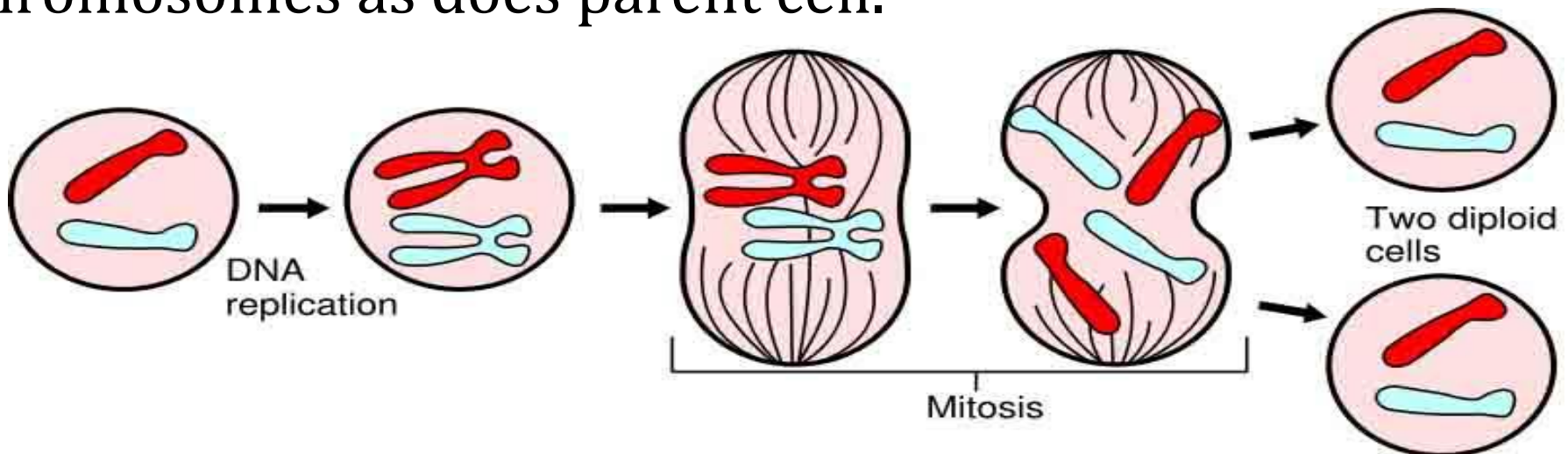
Mitosis

Division of **somatic** cells (non-reproductive cells) in eukaryotic organisms.



A single cell divides into two identical daughter cells.

Daughter cells have same number of chromosomes as does parent cell.



Packing for the move...

When the cell is not dividing...

- DNA molecules are in extended, uncondensed form = **chromatin**
- Cell can only replicate and transcribe DNA when it is in the extended state.

When the cell is preparing for division...

- DNA molecules condense to form **chromosomes** prior to division.
 - each chromosome is a single molecule of DNA
 - easier to sort and organize the replicated DNA into daughter cells



Dude, mitosis starts in five minutes...
I can't believe you're not condensed yet.

Mitosis

4 sub-phases:

1st – Prophase

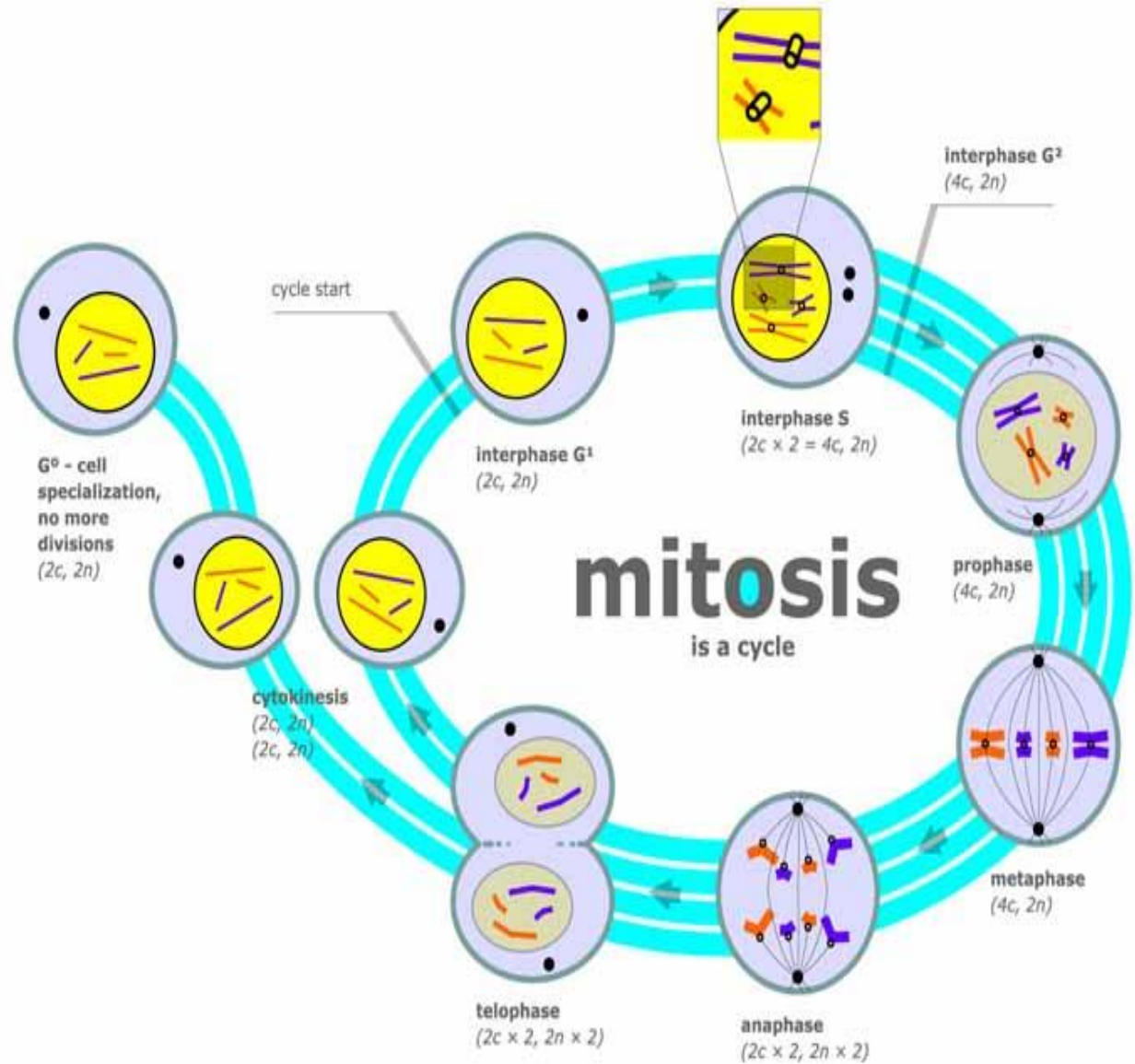
2nd – Metaphase

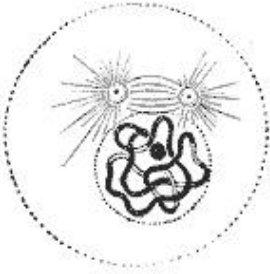
3rd – Anaphase

4th – Telophase

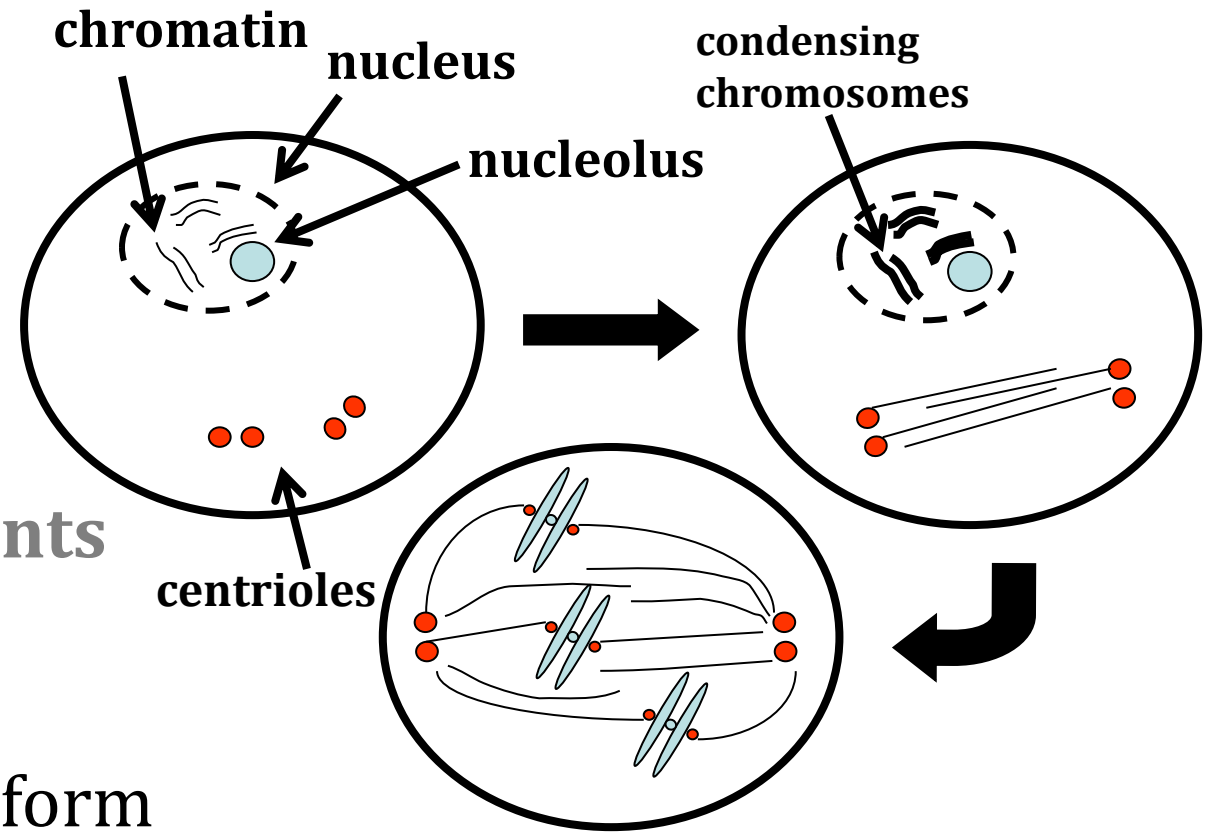
followed by

Cytokinesis



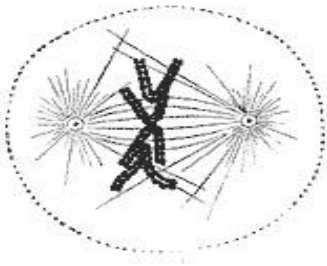


1. Prophase



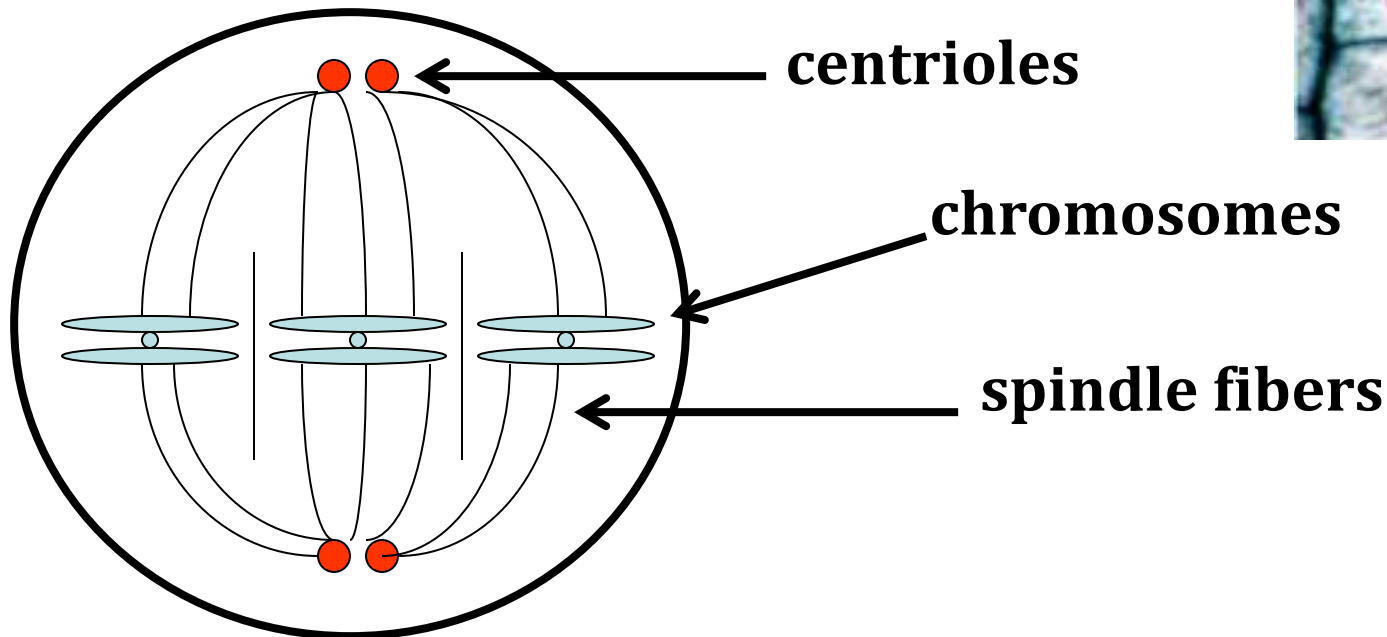
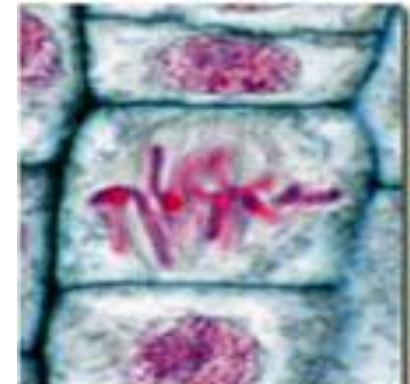
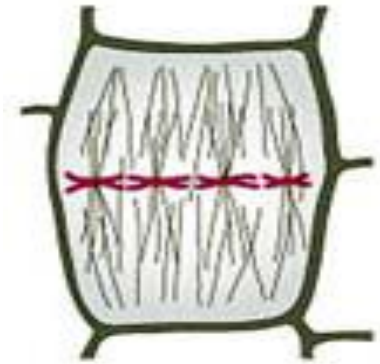
Three Major Events

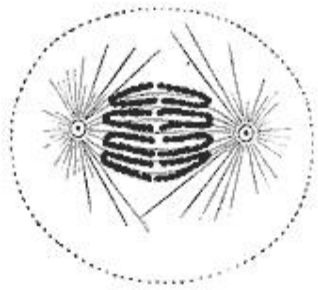
1. chromosomes condense
2. spindle fibers form
 1. (spindle fibers are specialized microtubules radiating out from centrioles)
3. chromosomes are captured by spindle



2. Metaphase

- chromosomes align along the equator of the cell, with one chromatid facing each pole





3. Anaphase

- sister chromatids separate
- spindle fibers attached to kinetochores **shorten** and **pull** chromatids towards the poles.
- free spindle fibers **lengthen** and **push** the poles of the cell apart

