

Mitosis

Why divide?

- Reproduction
- Growth
- Repair

Nucleus

Cytoskeleton

Function:

Structural support

Motility

Regulation

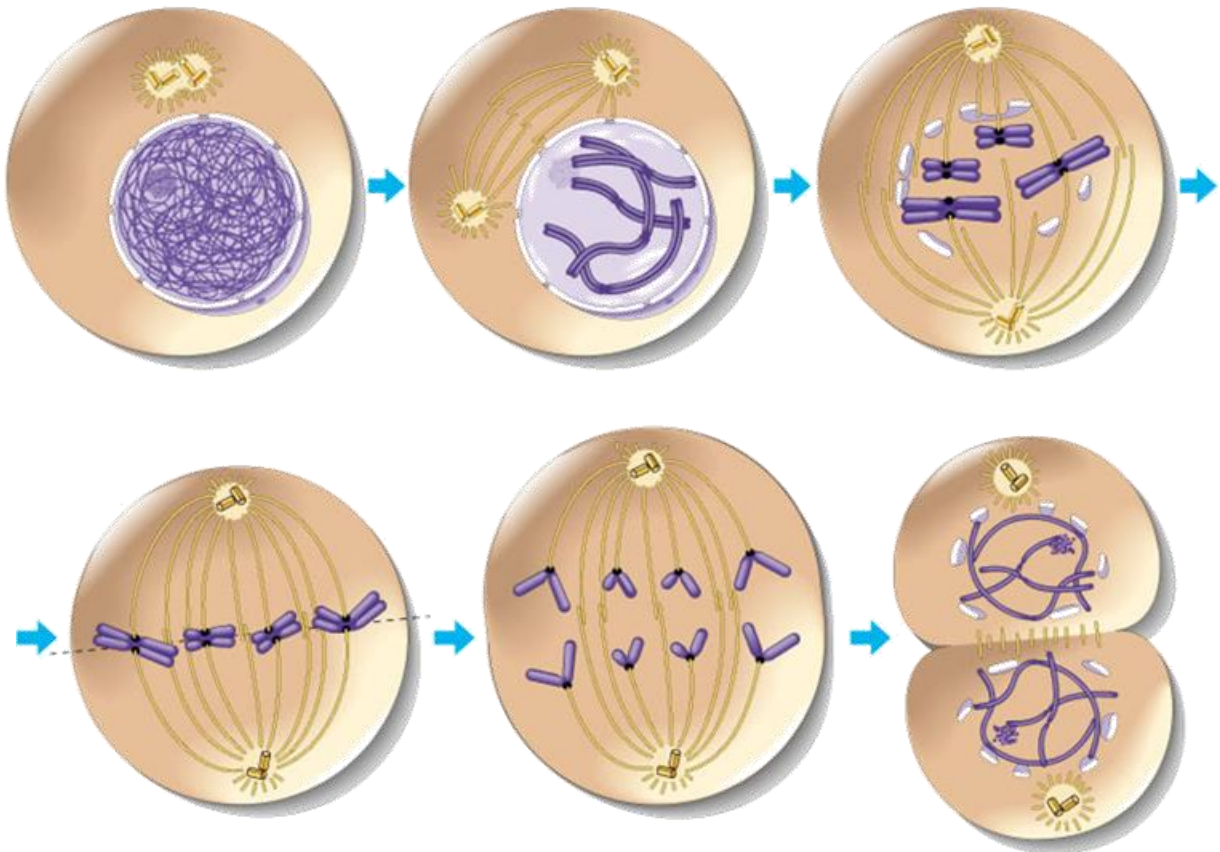
Structure:

Centrioles

in animal cells, pair of _____ organize _____

_____ guide chromosomes in _____

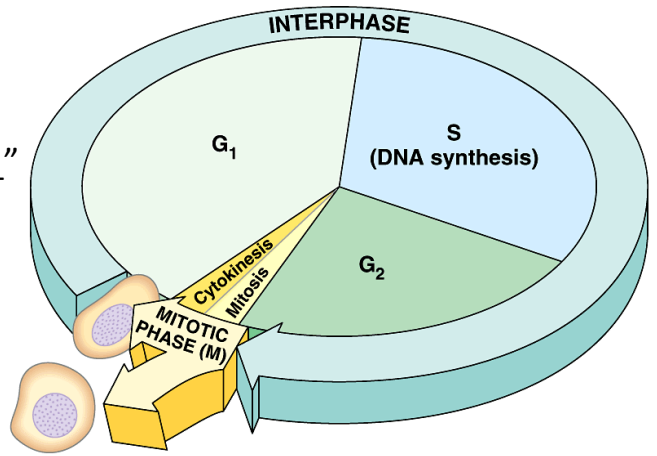
What gets passed on?



Interphase:

- _____ of cell life cycle
- cell doing its " _____ "
 - prepares for _____

Three phases:



- _____ well-defined
- DNA loosely packed in long _____ fibers

Prepares for mitosis

- _____ chromosome
 - DNA & proteins
- produces _____

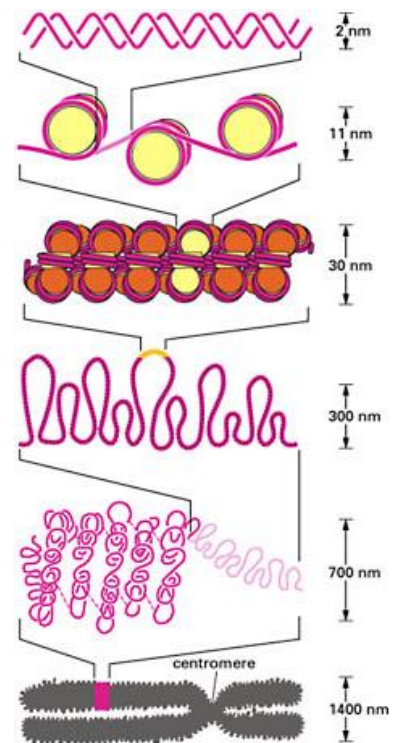
S Phase

“S” is for

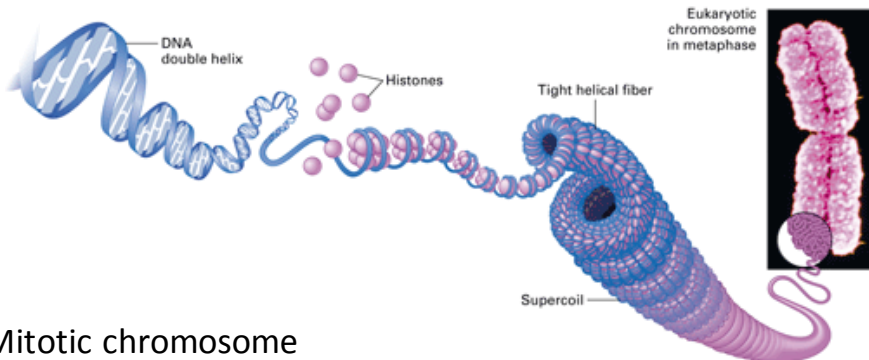
- dividing cell _____
- must separate DNA copies correctly to 2 daughter cells
 - human cell duplicates ~3 meters DNA
 - each daughter cell gets complete identical copy
 - error rate = ~1 per 100 million bases
 - 3 billion base pairs in mammalian genome
 - ~30 errors per cell cycle
 - mutations (to somatic (body) cells)

Organizing DNA

- double helix _____ molecule
- wrapped around _____
- DNA-protein complex =



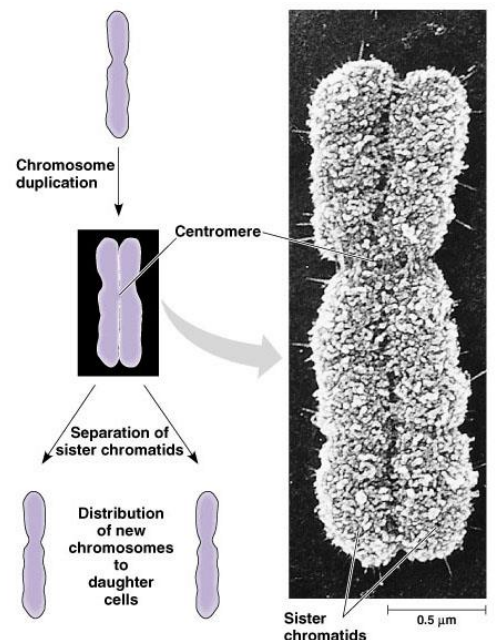
After DNA duplication, _____



Mitotic chromosome

- 2 _____
- Narrow at _____
- Contain identical copies of original DNA

Mitosis:

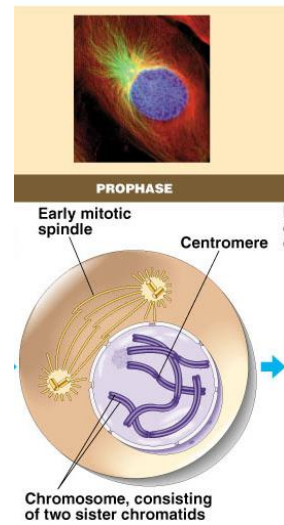


4 Phases:

Prophase:

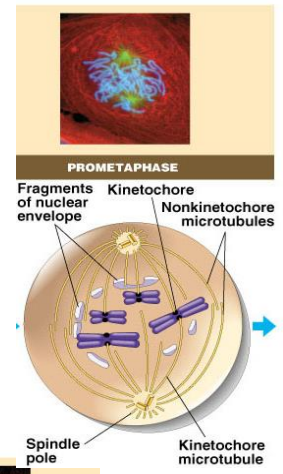
Chromatin condenses

- _____
 - chromatids
- _____ move to opposite poles of cell
 - animal cell
- Protein fibers cross cell to form _____
 - _____
 - actin, myosin
 - coordinates movement of chromosomes
- _____
- _____



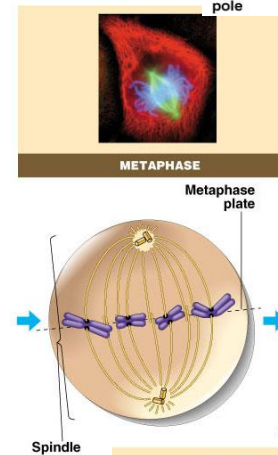
Prometaphase

- _____
 - creating _____
- microtubules attach at kinetochores
 - connect _____ to _____
- _____



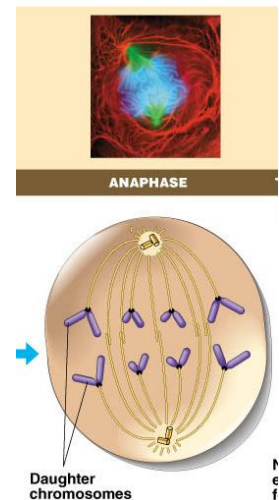
Metaphase

- _____
- _____
 - meta =
- spindle fibers coordinate movement
- helps to ensure chromosomes separate properly
 - each new nucleus receives only 1 copy of each chromosome



Anaphase

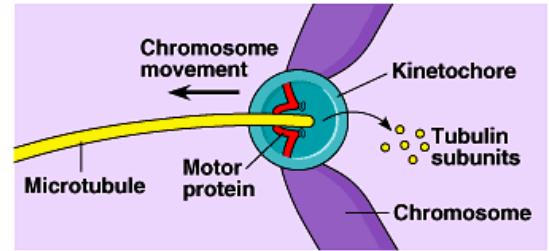
- _____ at kinetochores
 - move to opposite poles
 - pulled at centromeres
 - pulled by _____ "walking" along _____
 - actin, myosin
 - increased production of _____
- Poles move farther apart
 - polar microtubules lengthen



Chromosome Movement

Kinetochores use motor proteins that “walk” chromosome along attached microtubule

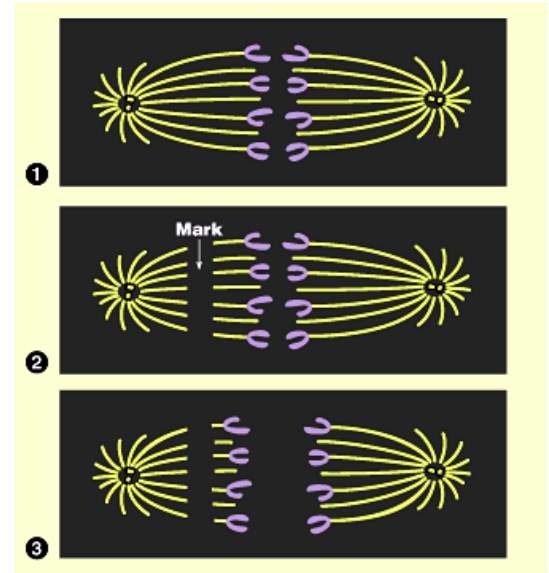
- microtubule shortens by dismantling at _____ (chromosome) end.



(a) Hypothesis

Telophase

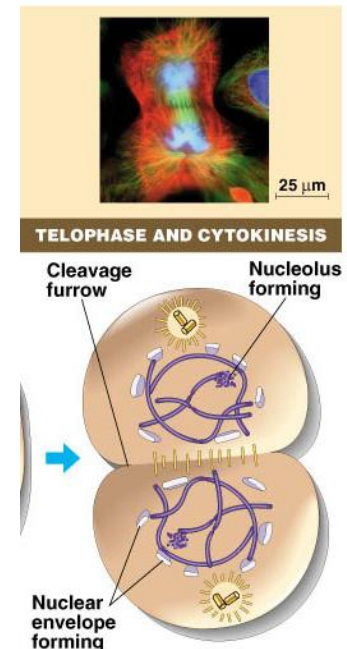
- Chromosomes arrive at opposite poles
 - _____
 - nucleoli form
 - _____
 - no longer visible under light microscope
- Spindle fibers disperse
- _____ begins



(b) Experiment

Cytokinesis

- Animals
 - constriction belt of _____ around equator of cell
 - _____ forms
 - splits cell in two
 - like tightening a draw string



Evolution of mitosis

- Mitosis in eukaryotes likely evolved from _____ in bacteria
 - single circular chromosome
 - no membrane-bound organelles