

Chapter 10-1 and 10-2

CELL DIVISION

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I. Why are cells so small?

A. Cells are **controlled** by **DNA**

B. As cells get **larger**, the **demands** on DNA **increase**

1. Cells can not make new organelles and proteins fast enough.
2. Cells can not get Energy, food, oxygen into the cell fast enough.
3. Cannot get waste out fast enough!

- C. The surface area of a cell is represented by the cell membrane.
- D. The volume of the cell is all of the space inside the cell (cytoplasm and organelles)
- E. The higher the surface area to volume ratio, the better it is to move materials in and out of the cell.

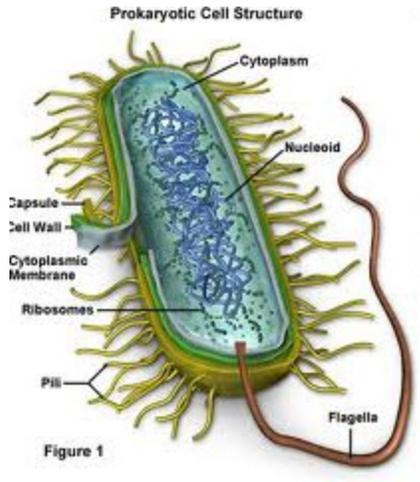
(Ideal surface area/volume ratio 3:1)

Is 5:1 ok?

Is 4:2 ok?

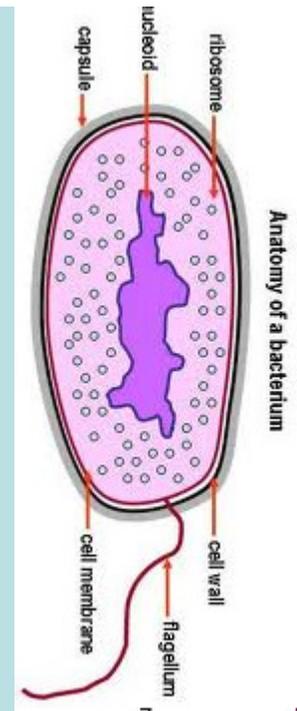
Is 8:2 ok?

Is 3:2 ok?



II. Cell division

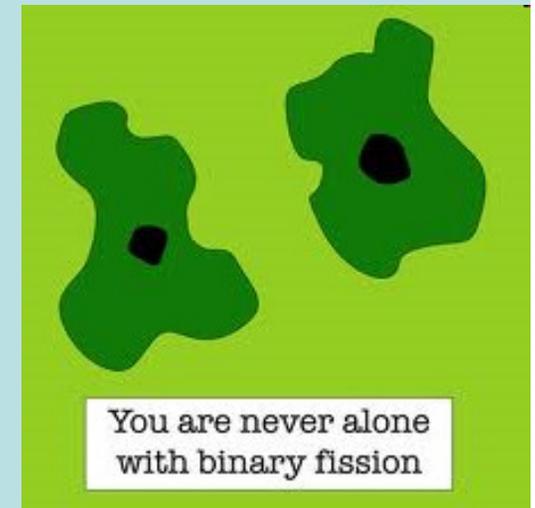
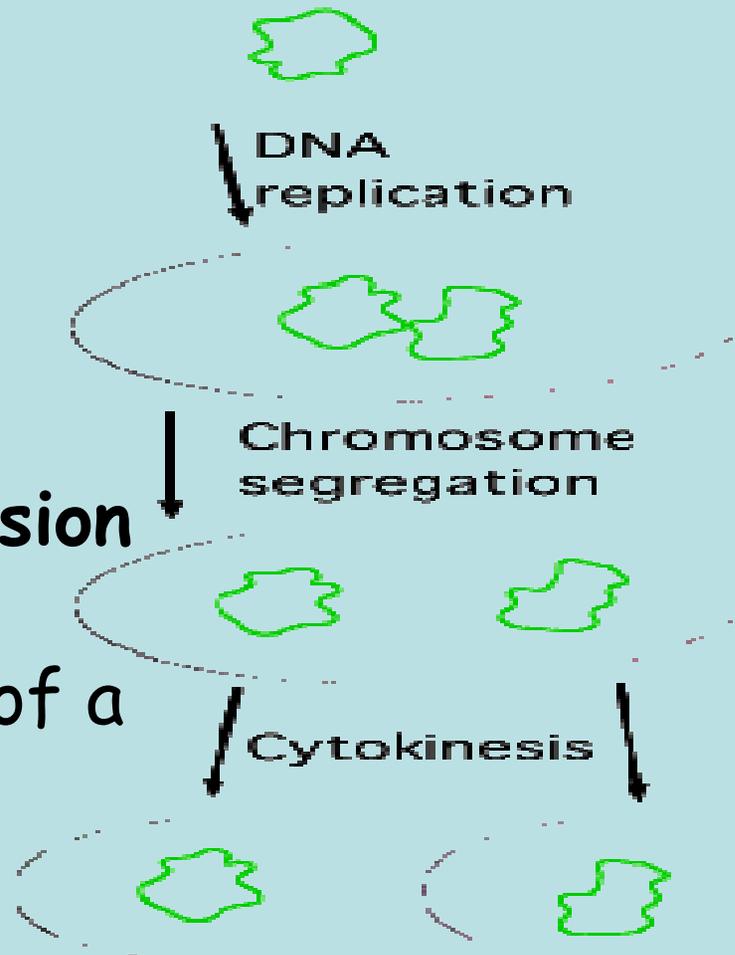
Binary fission



A. Prokaryotes-

1. simple

2. one cell division
is equal to
reproduction of a
new organism



3. Considered **asexual** reproduction

a. One parent

b. cells are genetically **identical** to original

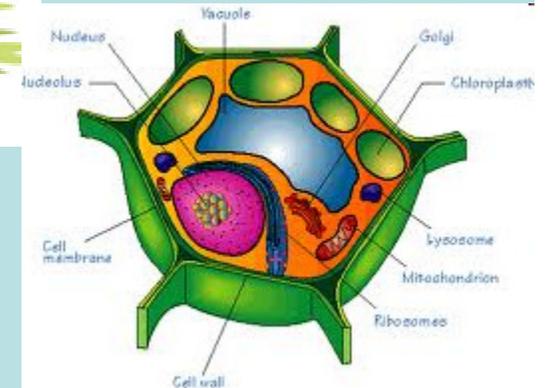


B. Eukaryotes



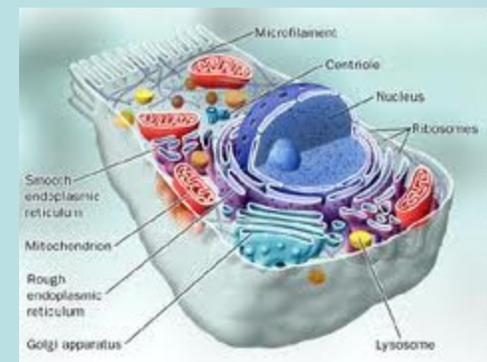
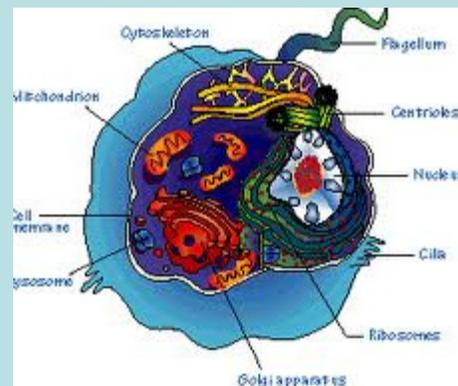
1. Complex cell division

2. Two types



a. Mitosis- division nucleus of somatic cells

b. Meiosis-division nucleus of gametes (reproductive cells)



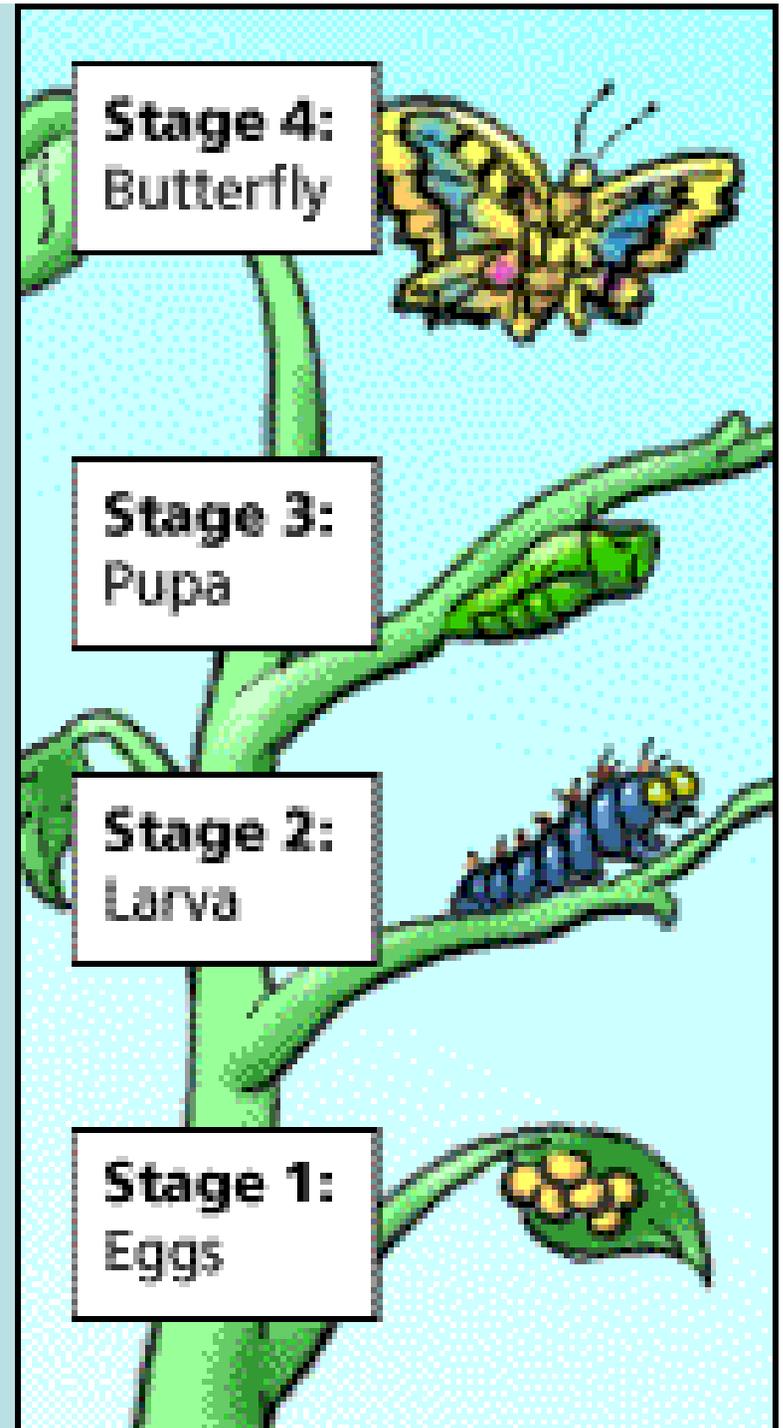
III. Somatic Cell Division

A. Two stages

1. mitosis-division of the nucleus
2. cytokinesis-division of cytoplasm

3. Occurs in Multicellular organisms

4. **PURPOSE:**
GROWTH and
DEVELOPMENT



IV. Chromosomes

- A. Composed of DNA
wrapped around proteins
- B. Contains genetic info for
making PROTEINS
- C. Not all organisms have the
same number of chromosomes
- D. Humans have 46
chromosomes 23 pair



E. The number of chromosomes does NOT indicate complexity of organism.



Camels 70

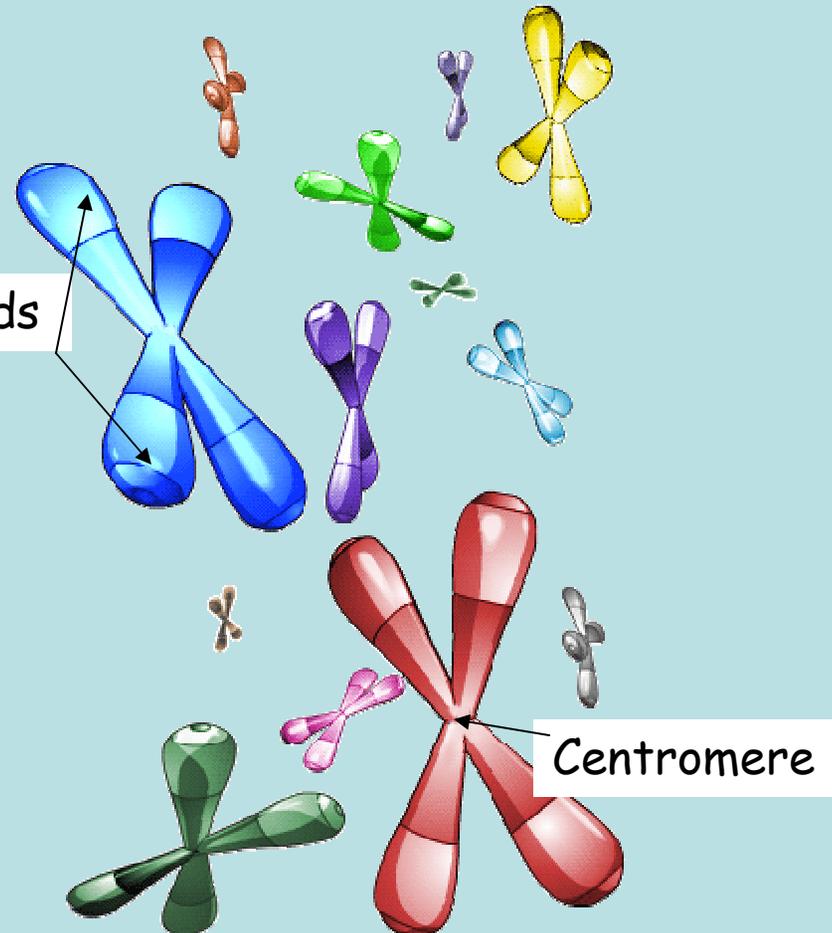


F. Chromosomes are visible **ONLY** during cell division

G. Chromosomes replicate **BEFORE** cell division

H. Chromosomes consists of two sister chromatids held together by a centromere.

**Sister Chromatids are the original and copy (made during S-Phase connected by a centromere.



V. Cell Cycle-NOT JUST CELL DIVISION!

- A. Period of time from one cell division to the next cell division
 - 1. The cell grows
 - 2. DNA/chromosomes replicate
 - 3. Gets ready for mitosis
 - 4. Then cell can divide

- B. 4 phases- of cell cycle
 - 1. G1 phase
 - 2. S phase
 - 3. G2 phase
 - 4. M phase

1. **G1 Phase**- growth phase
makes proteins and organelles
2. **S Phase**- chromosomes replicate
3. **G2 Phase**- final prep for cell division
 - organelles needed for mitosis are replicated
 - growth continues
 - shortest phase

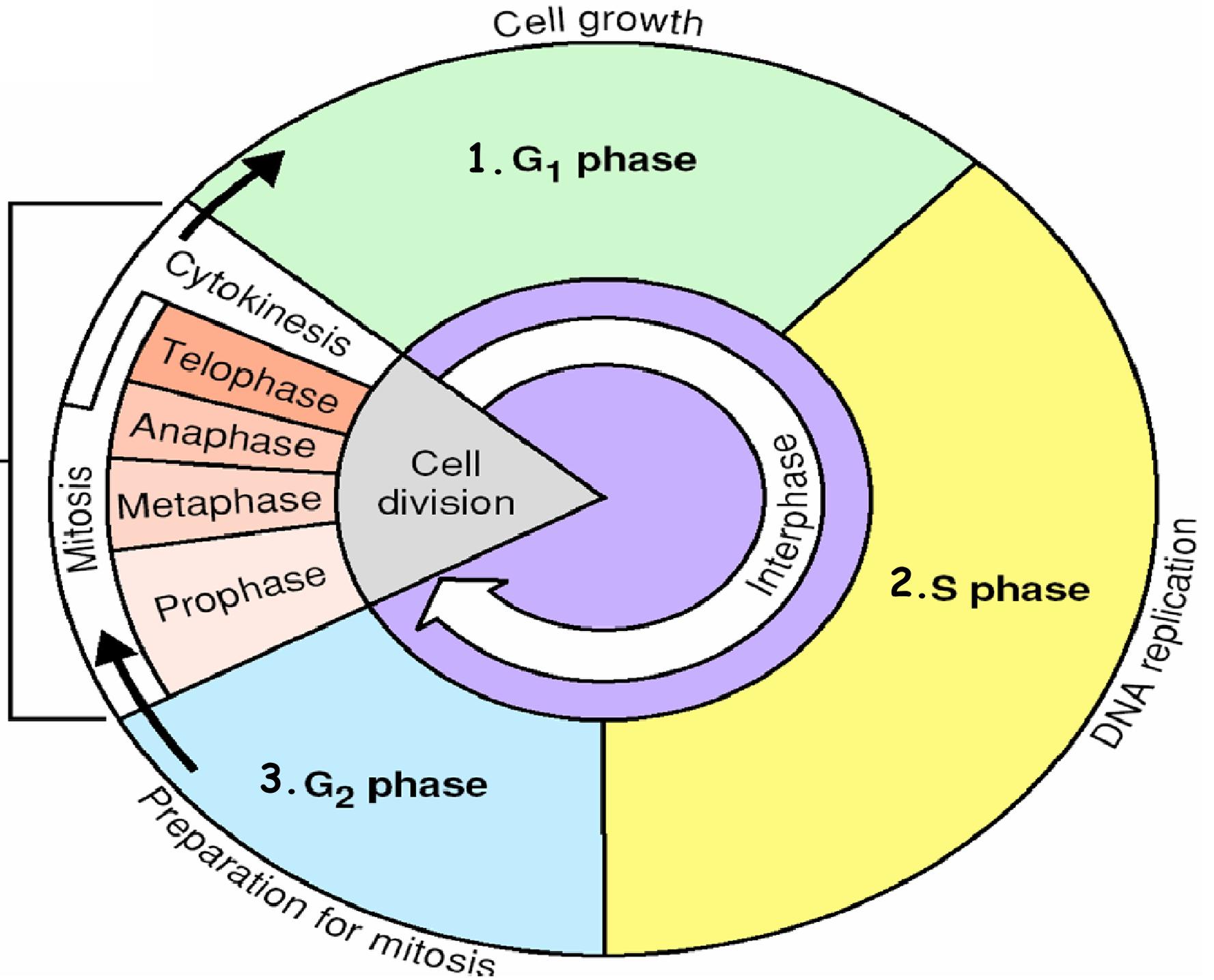
***** The 1st- 3rd stages combined are called
INTERPHASE*****

4. **M Phase**- also called "cell division" because this is when dividing takes place. After interphase.

a. Mitosis (division of **nucleus**)

b. Cytokinesis (division of **cytoplasm** and its contents)

4. M phase



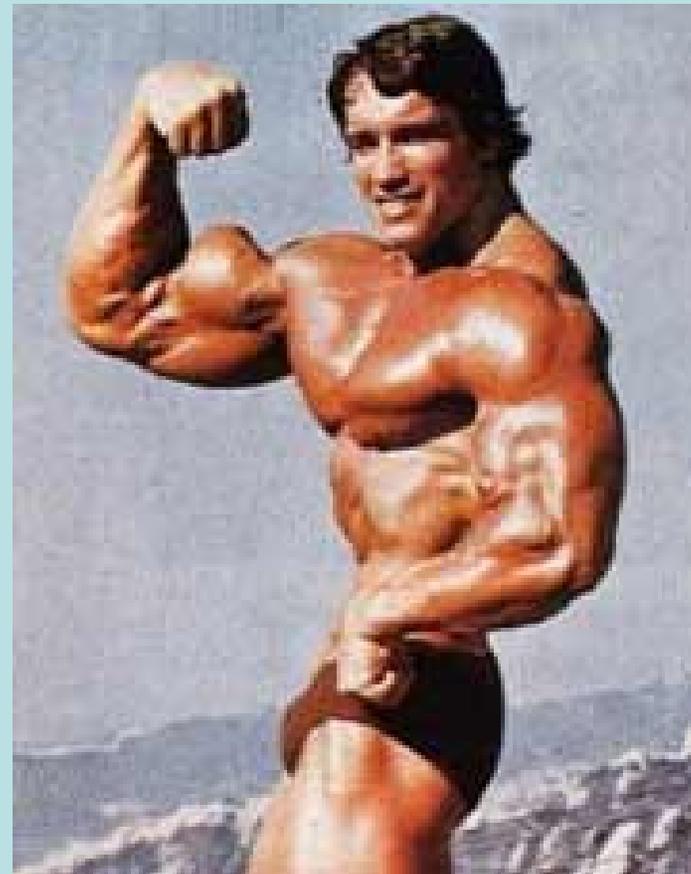
C. Average length of cell cycle is 20 hours, but can be as short as 30 min.



D. Some cells never divide once they are formed

1. _____

2. _____



E. When cells stop growing- they stay in G1 phase until death. This causes aging of the organism.

F. Uncontrolled cell division results in SOME cancers.