CONCEPT: CELL CYCLE REGULATION

●Cell division is controlled/activated by a variety of cellular signals in the form of proteins called _____ **factors**.

□ **Growth factor**: a biological substance that _____ cell division.

●Also, multiple Cell Cycle "_____" *prevent* the cell from entering the next phase *prematurely*.

□ If an error is detected at any checkpoint, a protein called *p53* can trigger repair or _____ (cell death).

□ A cell that "ignores" cell cycle checkpoints can lead to _____.

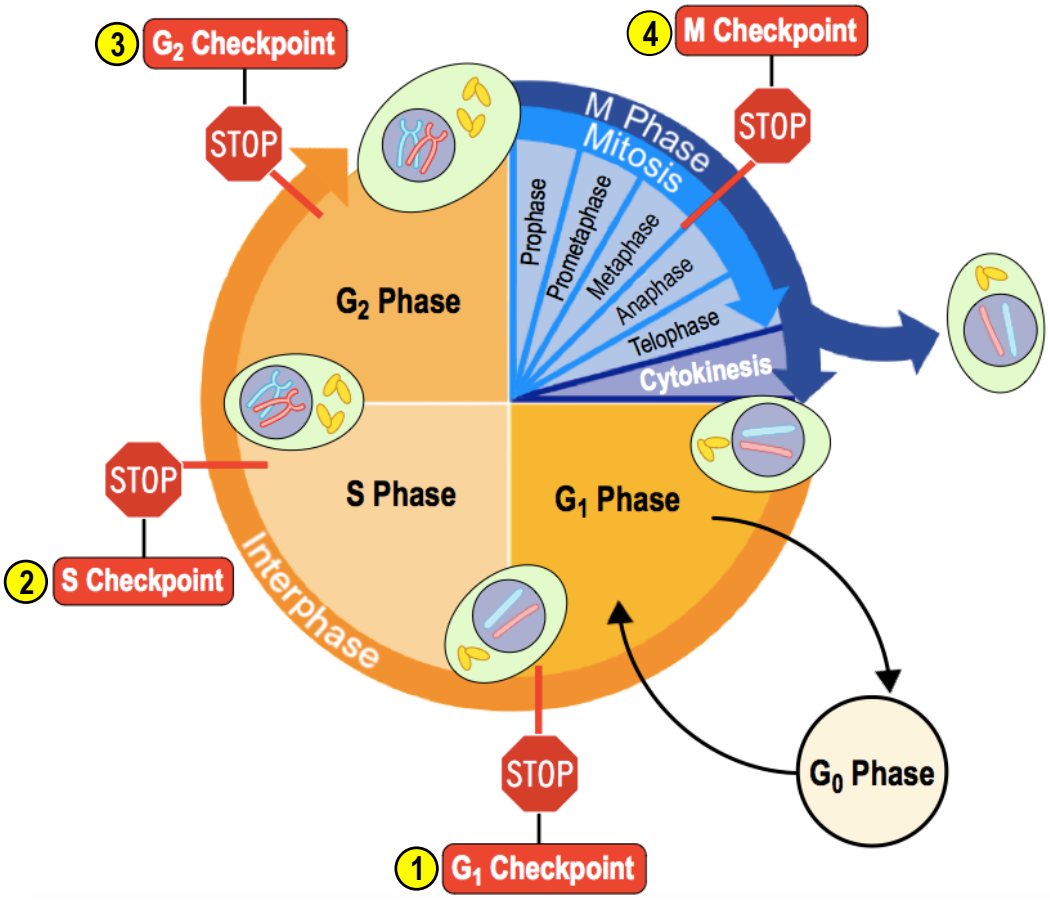
Cell Cycle Checkpoints

●_____ major checkpoints control the progress of the Cell Cycle:

□ These checkpoints don't need to be memorized if you understand the cell cycle.

1. _____ **Checkpoint**: the cell fixes damaged/mutated DNA in preparation for DNA replication in the S phase.
2. _____ **Checkpoint:** confirms proper _____ of *genetic material* & attempts to fix any errors.
3. _____ **Checkpoint:** ensures all enzymes & proteins needed for mitosis & cytokinesis are available.
4. _____ **(Metaphase) Checkpoint:** confirms that all *chromosomes* are aligned & *spindle fibers* are attached properly.

EXAMPLE: Checkpoints of the Cell Cycle.



CONCEPT: CELL CYCLE REGUALTION

PRACTICE: What is the purpose of cell cycle checkpoints?

a) To coordinate a cell's specialization for its role in particular tissues.
b) To prevent the cell from pausing the cell cycle when problems are detected.
c) To ensure that cells containing errors in their DNA do not undergo apoptosis.
d) To coordinate movement of vesicles through the cell.
e) To ensure that a cell only proceeds to the next phase in the cell cycle if it is ready.

PRACTICE: Checkpoints within the cell cycle:

a) Are located within interphase and allow entry to G0.
b) Are located within G1, S and G2.
c) Are located within G1, M and G2.
d) Are located within G1, M, S and G2.
e) Are located within all the phases of the cell cycle.

PRACTICE: The M phase checkpoint ensures that all chromosomes are attached to the mitotic spindle. If this does not happen, cells would most likely be arrested in _____.

a) Telophase.
b) Prophase.
c) G2.
d) Metaphase.

PRACTICE: Which of the following cell cycle checkpoints ensures that the genetic material is fully replicated before mitosis?

a) G0.
b) M.
c) G1.
d) G2.
e) S.