**The Cell Cycle**

**5.1 Cells have distinct phases of growth, reproduction, and normal functions.**

The cell cycle has four main stages.

The cell cycle is a regular pattern of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The main stages of the cell cycle are gap 1, synthesis, gap 2, and mitosis.

* + \_\_\_\_\_\_\_\_\_\_ (G1): cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ functions
	+ DNA \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (S): copies \_\_\_\_\_\_\_\_\_\_
	+ Gap \_\_\_\_ (G2): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (M): includes division of the cell \_\_\_\_\_\_\_\_\_\_\_ (mitosis) and division of the cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

Mitosis occurs only if the cell is \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ and the DNA is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

DRAW/LABEL/COLOR

Cells divide at different rates. \*\*Write Table

The rate of cell division varies with the need for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Some cells are unlikely to divide (\_\_\_\_\_).

Cell size is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. \*\*Write Table

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases faster than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.
* Surface area must allow for adequate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of materials.
	+ Cell growth is coordinated with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Cells that must be large have unique \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	1. **MITOSIS & CYTOKINESIS Cells divide during mitosis and cytokinesis.**

Chromosomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the start of mitosis.

* DNA wraps around \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ it.
* DNA plus proteins is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. DRAW
	+ One half of a duplicated chromosome is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Sister chromatids are held together at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ protect DNA and \_\_\_\_\_ \_\_\_\_\_\_\_\_\_ include genes.
* Mitosis and cytokinesis produce 2 genetically identical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ prepares the cell to divide.
	+ During interphase, the \_\_\_\_\_\_\_\_ is duplicated.
* Mitosis divides the cell’s nucleus in \_\_\_\_\_\_\_ phases.
	+ During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, chromosomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ fibers form. Draw
	+ During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, chromosomes line up in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the cell. Draw
	+ During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, sister chromatids separate to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Draw

* + During \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the new \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form and chromosomes begin to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Draw
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ differs in animal and plant cells. DRAW
	+ In animal cells, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ In plant cells, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**5.3 Cell cycle regulation is necessary for healthy growth.**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors regulate cell division.

* External factors include \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ signals.
* Growth factors are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that stimulate cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Most mammal cells form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ layer in a culture dish and stop dividing once they touch \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.
* 2 of the most important internal factors are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_.
* External factors trigger \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors, which affect the cell \_\_\_\_\_\_

Apoptosis is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* + a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ feature of healthy organisms
	+ caused by a cell’s production of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ occurs in development of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cell division is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Cancer cells form disorganized clumps called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tumors remain clustered and can be removed.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tumors \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or break away, and can form \_\_\_\_\_\_\_\_\_\_\_\_ tumors.
* Cancer cells \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carry out necessary functions.
* Cancer cells come from normal cells with damage to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ involved in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are substances \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to promote cancer.
* Standard cancer treatments typically kill both \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells.

5.4 Asexual Reproduction: **Many organisms reproduce by cell division.**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is similar in function to mitosis.
* Asexual reproduction is the creation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. DRAW
	+ Binary fission produces \_\_\_\_\_\_\_\_\_ daughter cells \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cell.
	+ Binary fission occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ determines what form of reproduction is most advantageous.
	+ Asexual reproduction is an advantage in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + Sexual reproduction is an advantage in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ conditions
* Some eukaryotes reproduce through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms a new organism from a small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ growing on the surface of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the splitting of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ into pieces that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ grow into a \_\_\_\_\_\_\_\_\_\_ organism.
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reproduction forms a new \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a stem or underground structure on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ plant.

5.5 Multicellular Life: **Cells work together to carry out complex functions.**

Multicellular organisms depend on interactions among different \_\_\_\_\_\_\_\_\_\_ types.

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are groups of \_\_\_\_\_\_\_\_\_\_ that perform a similar function.
* Organs are groups of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that perform a specific or related function.
* \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are groups of organs that carry out similar functions.

Specialized cells perform specific functions.

* Cells develop into their mature forms via the process of cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Cells differ Because different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* A cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ helps determine how it’ll differentiate.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells are unique body cells.

* Stem cells have the ability to DRAW
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ themselves
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in form
	+ develop into a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of specialized cell types
* Stem cells are classified into \_\_\_\_\_ types. DRAW TABLE
	+ \_\_\_\_\_\_\_\_\_\_potent, or growing into \_\_\_\_\_\_ other cell type
	+ \_\_\_\_\_\_\_\_\_\_potent, or growing into any cell type but a \_\_\_\_\_\_\_\_potent cell
	+ \_\_\_\_\_\_\_\_\_\_potent, or growing into cells of a closely \_\_\_\_\_\_\_\_\_\_\_\_ cell family
* Stem cells come from \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Adult stem cells can be hard to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.
	+ The use of adult stem cells may prevent transplant \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ The use of embryonic stem cells raises \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ issues
	+ Embryonic stem cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and can be grown \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in culture.
* The use of stem cells offers many currently realized and potential benefits.
	+ Stem cells are used to treat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
	+ Stem cells may \_\_\_\_\_\_\_\_\_\_\_\_ disease or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ damaged \_\_\_\_\_\_\_\_\_.
	+ Stem cells may revolutionize the \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process.