Cell Division & Genetics

Why do Cells Divide? For \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. Mitosis
   1. Organisms grow by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of cells
      1. In multicellular organisms some of these cells perform functions different from other cells.
      2. The process of a cell becoming different is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
      3. Under normal conditions once an animal cell becomes specialized it can no longer form an entire organism, however plant cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and any cell can form an entire plant.
   2. Cell Division vs. Nuclear Division
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The actual division of the cell into two new cells.
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: The division of the nucleus of the cell into two new nuclei.
      3. Note: Sometimes cells go through mitosis without going through cytokinesis.
   3. How do Cells Divide?
      1. **Cell cycle** - sequence of phases in the life cycle of the cell
      2. Cell cycle has two parts:
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (interphase)
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
            1. mitosis (nuclear division)
            2. cytokinesis (cytoplasm division)
      3. Phases of the Cell Cycle
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
            1. Occurs between divisions
            2. Longest part of cycle
            3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

G1 or \_\_\_\_\_\_\_\_\_\_\_\_

The cell just finished dividing so in Gap 1 the cell is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ from mitosis

S or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ stage

\_\_\_\_\_\_\_\_\_\_\_ replicates

G 2 or \_\_\_\_\_\_\_\_\_

This is preparation for mitosis

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are replicated.

More growth occurs.

* + - 1. Prophase
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ condense
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ form
         3. The nuclear envelope \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are pulled to center of cell
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_ along “metaphase plate”
      3. Anaphase
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ divide
         2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pull one set of chromosomes to each pole
         3. Precise alignment is critical to division
      4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forms around chromosomes
         2. Chromosomes uncoil
         3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

animals - \_\_\_\_\_\_\_\_\_\_\_\_\_ of plasma membrane

plants- \_\_\_\_\_\_\_\_\_\_\_\_ and the cell plate forms (future cell wall and cell membrane)

1. Meiosis
   1. What is Meiosis?
      1. A division of the \_\_\_\_\_\_\_\_\_\_\_\_\_ that reduces chromosome number by half.
      2. Important in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      3. Involves combining the \_\_\_\_\_\_\_\_\_\_\_\_\_ information of one parent with that of the other parent to produce a genetically distinct individual
   2. Terminology
      1. \_\_\_\_\_\_\_\_\_\_\_ - two sets of chromosomes (2n), in humans 23 pairs or \_\_\_\_\_ total
      2. \_\_\_\_\_\_\_\_\_\_\_ - one set of chromosomes (n) - gametes or sex cells, in humans \_\_\_\_\_ chromosomes
      3. Chromosome Pairing
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ = each chromosome in pair are \_\_\_\_\_\_\_\_\_\_\_\_\_ to the other (carry genes for same trait)
         2. only \_\_\_\_\_\_\_\_\_\_\_\_\_ differs - sex chromosomes X or Y
         3. XX = female; XY = male
      4. Phases of Meiosis
         1. A \_\_\_\_\_\_\_\_\_\_\_ cell replicates its chromosomes
         2. \_\_\_\_\_\_ stages of meiosis
            1. Meiosis I and Meiosis II
            2. Only 1 replication
         3. Terms
            1. \_\_\_\_\_\_\_\_\_\_\_\_ - pairing of homologous chromosomes forming a \_\_\_\_\_\_\_\_\_\_\_.
            2. \_\_\_\_\_\_\_\_\_\_\_\_ - chromatids of tetrad exchange parts
         4. Meiosis I
            1. Prophase I

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ condense

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chromosomes pair w/ each other

Each pair contains \_\_\_\_\_\_\_ sister chromatids – tetrad

* + - * 1. Metaphase I

Tetrads or homologous chromosomes move to \_\_\_\_\_\_\_\_\_\_ of cell

* + - * 1. Anaphase I

Homologous chromosomes \_\_\_\_\_\_\_\_\_\_ to opposite poles

* + - * 1. Telophase I

Daughter nuclei formed

These are \_\_\_\_\_\_\_\_\_\_ (1n)

* + - 1. Meiosis II
         1. Daughter cells undergo a second division; much like \_\_\_\_\_\_\_\_\_\_\_\_
         2. NO ADDITIONAL REPLICATION OCCURS
         3. Prophase II

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ form again

* + - * 1. Metaphase II

Sister chromatids move to the \_\_\_\_\_\_\_\_\_\_

* + - * 1. Anaphase II

Centromeres split

Individual chromosomes are \_\_\_\_\_\_\_\_\_\_ to poles

* + - * 1. Telophase II & Cytokinesis

\_\_\_\_\_\_\_\_ haploid daughter cells results from one original diploid cell

* + - 1. Review of Mitosis & Meiosis
         1. Both are forms of \_\_\_\_\_\_\_\_\_\_\_ division
         2. Both involve \_\_\_\_\_\_\_\_\_\_\_\_\_
         3. Both involve \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the nucleus, and nucleolus, nuclear membrane
         4. Both involve formation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      2. Differences
         1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ produces daughter cells that have \_\_\_\_\_\_ the number of chromosomes as the parent. Go from 2n to 1n.
         2. \_\_\_\_\_\_\_\_\_\_ produced by meiosis are \_\_\_\_ genetically \_\_\_\_\_\_\_\_\_\_\_\_ to one another.
         3. In \_\_\_\_\_\_\_\_\_\_ cell division takes place \_\_\_\_\_\_\_\_\_\_\_ but replication occurs only \_\_\_\_\_\_\_\_\_\_.
      3. Value of Variation
         1. \_\_\_\_\_\_\_\_\_\_\_ - differences between members of a population.
         2. Meiosis results in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of chromosomes in gametes.
         3. Causes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that over time can be stronger for survival.