Mitosis-Meiosis

1. The Cell
   1. Cell division allows a single-celled fertilized egg to grow into an organism with trillions of cells
   2. Somatic Cells
      1. Body cells that continue to go through cellular division throughout the lifetime
   3. Apoptosis
      1. Pre-programmed cellular suicide
         1. Occurs during development to remove unwanted cells
            1. Webbing between the fingers and toes of a fetus
            2. Cancer Cells
2. The Cell Cycle
   1. 3-Stages of Interphase
      1. G1
      2. S
      3. G2
   2. Mitotic Stage
      1. Mitosis
         1. Prophase
         2. Metaphase
         3. Anaphase
         4. Telophase
         5. Cytokinesis
      2. Sister Chromatids
         1. Daughter Chromosomes
      3. Centromere
      4. Chromosome
         * 1. Diploid
           2. Haploid
      5. Chromatin
   3. Control of Cell Cycle and Cancer
      1. 3 Checkpoints
         1. Damaged cells shouldn’t complete mitosis
      2. Proto-oncogenes
      3. Oncogenes
      4. Tumor Suppressor Genes
      5. Carcinogenesis
3. Meiosis – Reducing the Number of Chromosomes
   * 1. Occurs in the life cycle of a sexually reproducing organism
     2. Reduces the chromosome number in half
     3. Provides offspring with a different combination of traits from either parent
   1. Meiosis I
      1. Homologues
      2. Synapsis
      3. Haploid
   2. Meiosis I is divided into
      1. Prophase I
         1. Synpasis occurs
         2. Nuclear membrane breaks down
         3. Homologues line up side by side
            1. Crossing-over occurs for recombines genetic material
      2. Metaphase I
         1. Homologues pairs line up across center of cell
      3. Anaphase I
         1. Independent assortment occurs as homologues separate from each other during anaphase I
      4. Telophase I
         1. May or may not occur at end of meiosis I
         2. Nuclear membrane re-forms
      5. Genetic variation occurs in two ways:
         1. Crossing-over
         2. Independent assortment
   3. Meiosis II
      1. Prophase II
         1. Cells have one chromosome from each homologous pair
         2. Nuclear membrane disassembles
         3. Spindle appears
         4. Chromatid attaches to the spindle
      2. Metaphase II
         1. Sister chromatids line up at the metaphase plate in the center of the cell
      3. Anaphase II
         1. Sister chromatids separate and become daughter chromosomes that migrate toward the poles
      4. Telophase II
         1. Spindle disappears
         2. Nuclear membrane re-forms
         3. Cytokinesis occurs
   4. Importance of Meiosis
      1. Produces haploid cells from diploid cells
      2. Genetic variations in cells
         1. Not identical to parents
         2. Occurs by crossing over and independent assortment
         3. Increases survival of the species
4. Comparison of Meiosis with Mitosis
   1. DNA replication occurs only once prior to either meiosis or mitosis
   2. Meiosis requires two divisions, mitosis requires onle
   3. Meiosis produces four daughter cells, mitosis produces two
      1. Four daughter cells from meiosis are haploid
      2. Two daughter cells from mitosis are diploid
   4. Daughter cells from meiosis are genetically different from original cell
   5. Daughter cells from mitosis are genetically identical to original cell
5. The Human Life Cycle
   1. Both mitosis and meiosis are required
   2. At fertilization a haploid (n) sperm and a haploid (n) egg fuse
      1. The result is a zygote which is diploid (2n)
   3. The fetus divides by mitosis for growth
6. Spermatogenesis and Oogenesis in Humans
   1. Spermatogenesis
      1. Meiosis in the testes of males
      2. Produces sperm
         1. Begins at puberty
   2. Oogenesis
      1. Meiosis in the ovaries of females
         1. Produces egg
            1. Begins in the fetus

Primary oocytes are arrested in prophase I

Resumes at puberty

One oocyte continues through meiosis per month during the menstrual cycle

If oocyte is fertilized it will start meiosis II