

Cell Division

1. In your own words, define cell division. What two types of cell division have we learned about?
2. Define in your own words the following terms (use drawings to help explain): chromatin, chromosome, sister chromatid, centromere, homologous chromosomes (or homologues)
Do sister chromatids carry identical genetic information? Do homologous chromosomes?
3. Describe the relationship between autosomes (somatic chromosomes), sex chromosomes, somatic cells and sex cells. Describe the terms diploid ($2N$) and haploid (N).
4. What is the cell cycle all about or what does it show? (briefly) Draw a simplified illustration of the cell cycle using only the words interphase, and mitosis. What is the longest phase of the cell cycle? Why must DNA replicate prior to mitosis and exactly when does this occur? What is cytokinesis and when does it occur?
5. What is the purpose of mitosis? Mitosis has four distinct stages. What are they and describe what happens in each stage. Draw a simple diagram of each phase.
6. Answer the following questions related to haploid vs. diploid cells:
 - If a cell has 13 chromosomes as a haploid cell, how many chromosomes are found in the diploid cell of the same organism?
 - If a somatic cell has 30 chromosomes, how many are in the gametes?
 - A gamete has 8 chromosomes, is this the N or $2N$ number? How many chromosomes then, are in the somatic cells?
 - If a somatic cell has 24 chromosomes, how many homologues are there?
 - What is the haploid and diploid number of chromosomes in humans?
7. What is the purpose of meiosis in multicellular organisms such as plants and animals?
8. Meiosis is broken into two parts: meiosis I and meiosis II. Name the stages of meiosis I and II. What is crossing over? When does it occur in meiosis? What is the significance of crossing over? Describe how the separation of chromosomes is different in Anaphase I and Anaphase II.
9. Crossing over, independent assortment and random fertilization are all components of meiosis. Explain what each of these is and what the contribution of these activities is to the well-being of the organism or its offspring.
10. How is the outcome of mitosis different from meiosis in cell number and chromosome number? If a cell has 32 chromosomes and undergoes meiosis, how many chromosomes would be found in each daughter cell? What if the original cell undergoes mitosis?
11. What is nondisjunction and what kind of disorders can result from this problem?

Be sure you know the meaning of these terms related to *cell division*:

DNA	Tetrads	Gametes
Chromosomes	Centrioles	Independent assortment
Chromatin	Microtubules/spindle fibers	Random fertilization
Chromatid	Metaphase plate	Nondisjunction
Homologous chromosome	Genome	Trisomy 21
Duplicated chromosome	Karyotype	Mutagens
Centromere	Nuclear envelope	Carcinogens
Gonads		