**Chromosomes, mitosis, and meiosis: Study guide and readings**

**Required readings: None**

1. An average chromosome is ~ 5 centimeters long and an average cell is ~ 10 micrometers. What is the role of nucleosome structure in terms of accommodating multiple chromosomes into a single nucleus in a single cell?
2. What is the rationale behind numbering chromosomes?
3. If you had to speculate, would an X chromosome be most likely to appear larger or smaller in a suitable prepared specimen, under a light microscope?
4. Why does mitosis produce 2 genetically identical daughter cells whereas meiosis produce 4 daughter cells that will be genetically identical only if the Megaspore Mother Cell is 100% homozygous?
5. When would you expect to see the highest level of gene expression from the most genes?
6. What is so important about the S phase in both mitosis and meiosis?
7. What is the same and what is different between difference between chromatin, chromosome, and chromatid?
8. Describe the key function of a centromere.
9. I diagrams, centromeres often appear as “extra knobs” on top of the underlying chromosomes. Is this technically correct?
10. If a plant is 2n = 42, how many pairs of sister chromatids do you expect at Metaphase of mitosis?
11. What is a bivalent and why aren’t there bivalents in mitosis?
12. If you looked under a microscope at cells in a rapidly dividing root tip, would you expect to observe mitosis or meiosis?
13. What will happened when spindle fibers fail to pull apart replicated sister chromatids in a plant that is 2n -= 14? In a plant that is n = 7?
14. When does recombination occur?

**Supplementary resources: Not required.**

Nucleosomes and gene regulation: <https://science.sciencemag.org/content/366/6461/35>

CenH3: Nucleosomes, histones, and doubled haploids. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4828581/>