

WEEK 4 EXPERIMENT ANSWER SHEET

Please submit to the Week 4 Experiment dropbox no later than Sunday midnight.

SUMMARY OF ACTIVITIES FOR WEEK 4 EXPERIMENT ASSIGNMENT

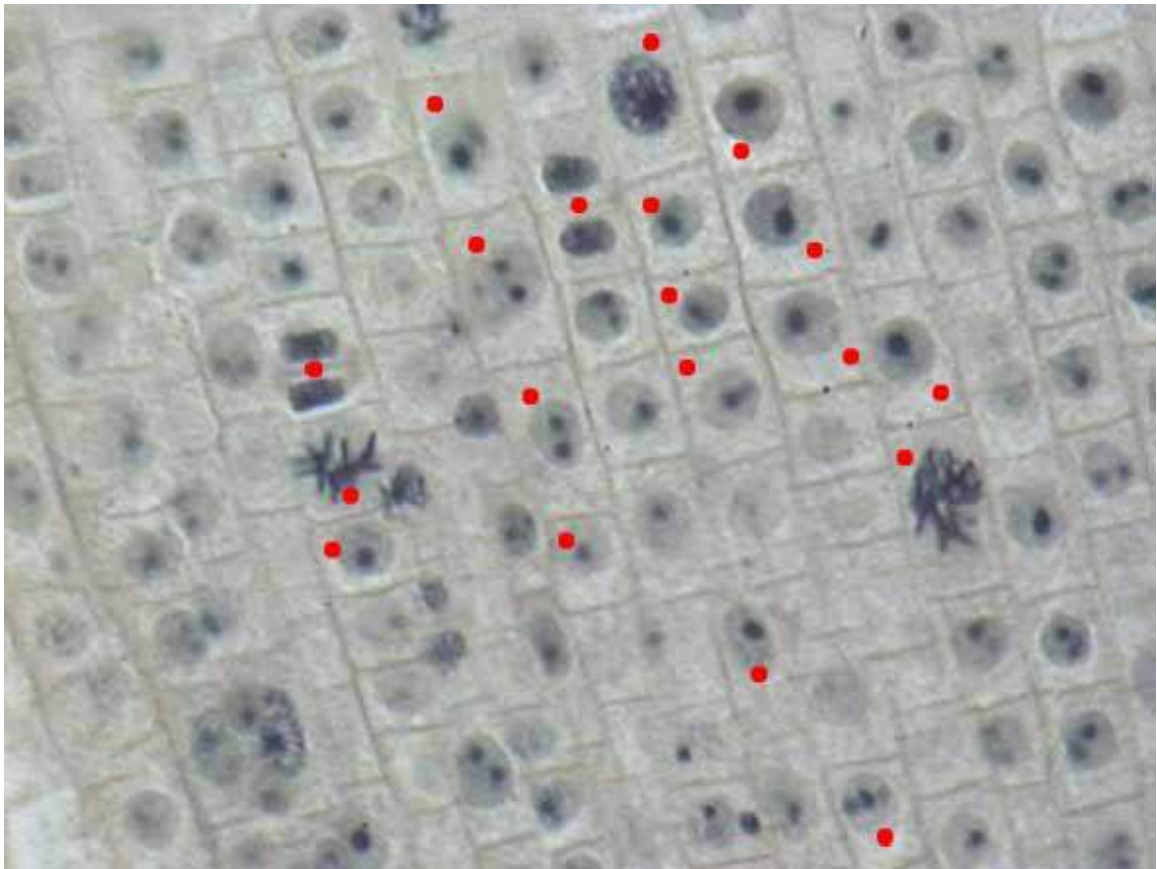
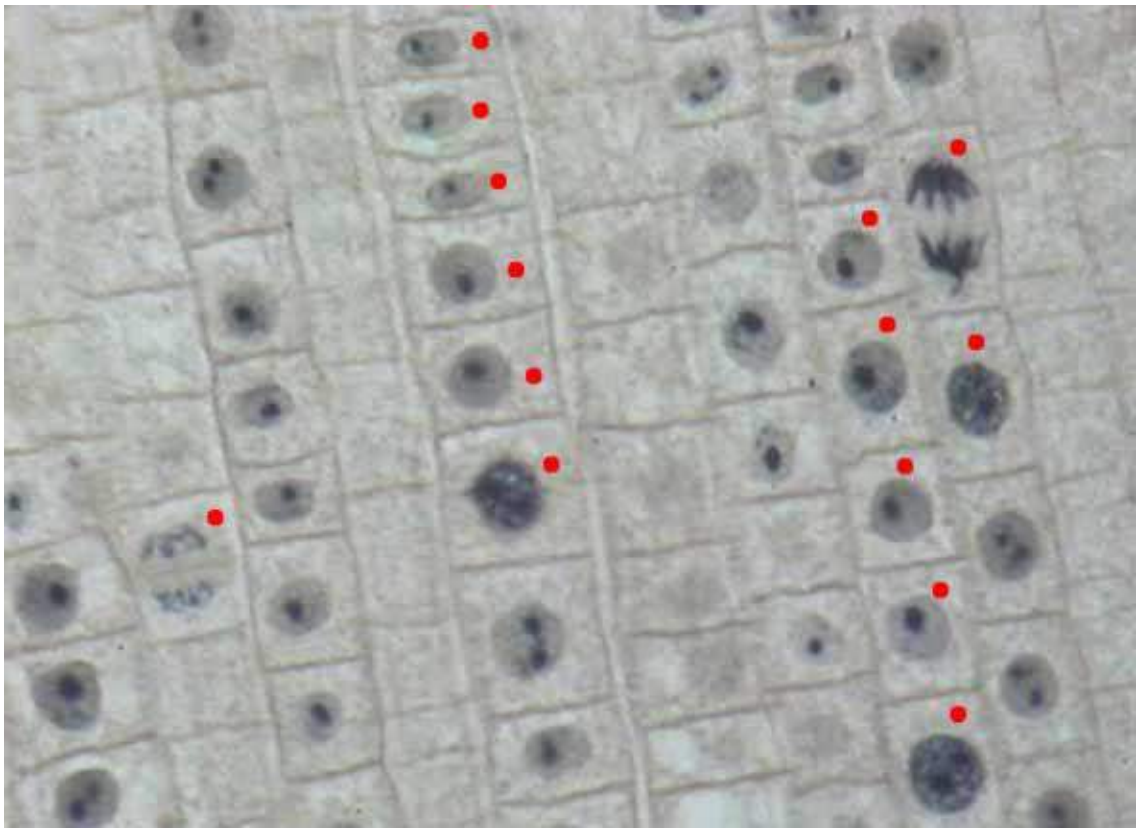
- **Experiment 4 Exercise 1** –Mitosis in a Plant Cell
- **Experiment 4 Exercise 2** – Meiosis
- **Experiment 4 Exercise 3** – Karyotyping

Experiment 4 Exercise 1: Mitosis in a Plant Cell

Read through the **Experiment 4 Introduction** material before starting. In this exercise we will look at the different stages of mitosis in onion cells. The length of the cell cycle in the onion root tip is about **24 hours**, but mitosis only occupies only one to two hours.

Procedure

- A. Review the information on p 125 in your book and record your predictions as to the percentage of cells you expect to see in each of the phases of the cell cycle in **Table 1** (after the photographs).
- B. In the four photographs below, examine each **cell** indicated by a red dot. There are a total of **65 cells** that need to be examined. Determine how many cells are in the various stages of the **Cell Cycle**. Refer to your book and the Experiment 4 Introduction information for help determining the cell cycle stages.
- C. Enter your data in **Table 1**. Note that the “Calculated %” is equal to the Number of cells in stage / Total cells counted x 100.
- D. Answer the **questions** that follow.



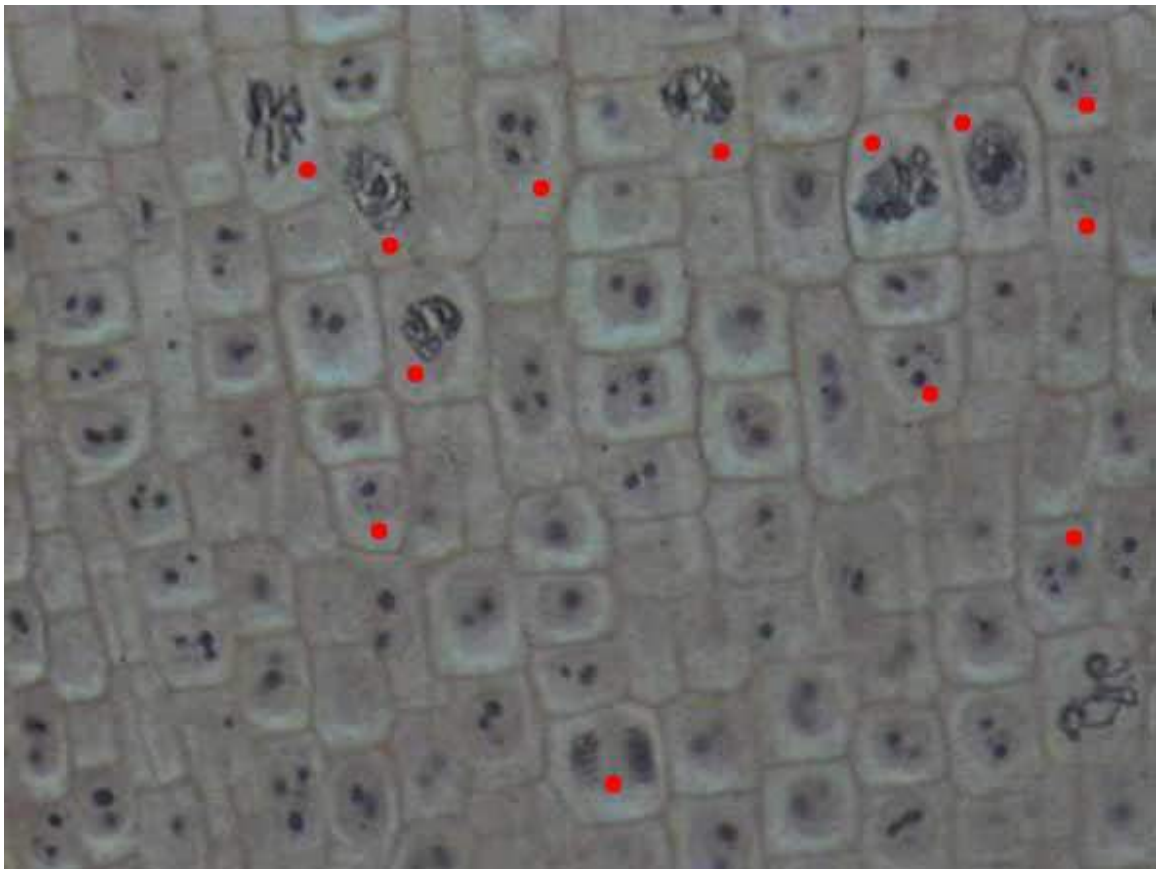
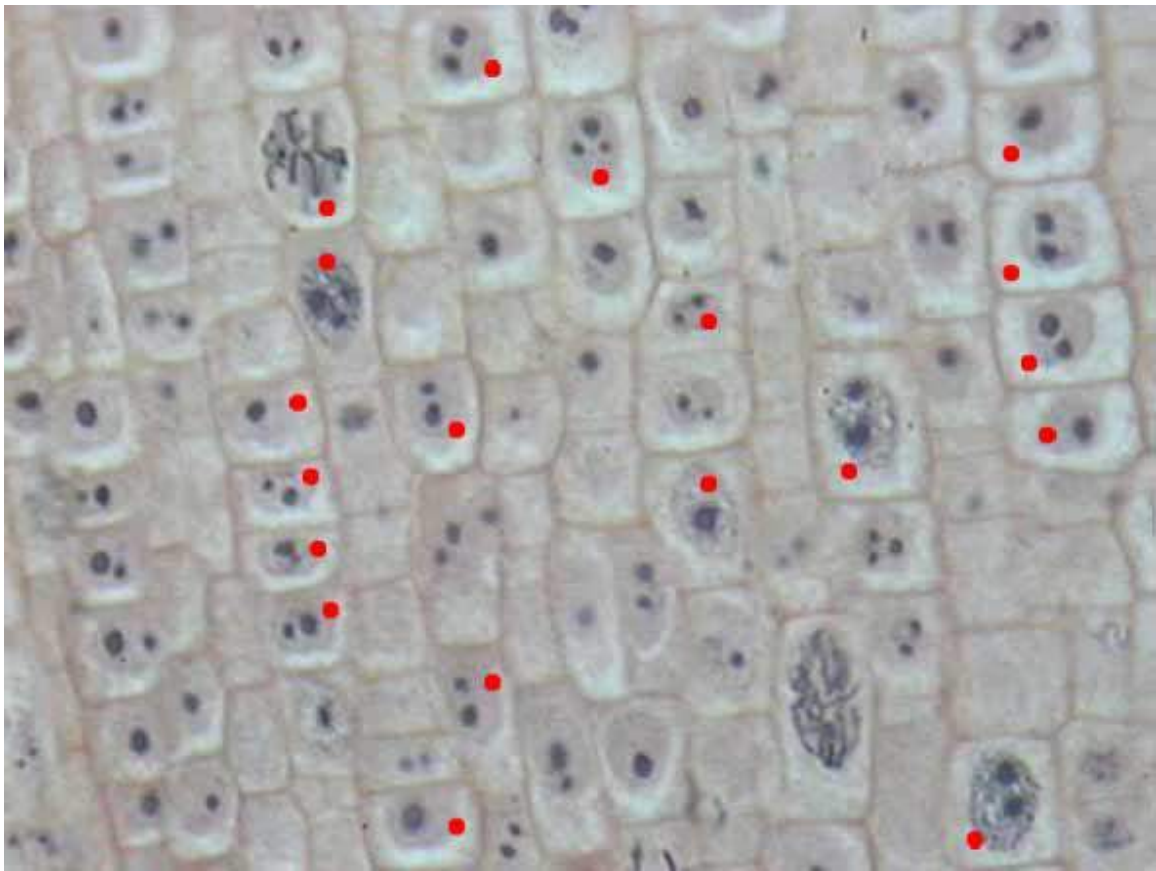


Table 1: Predictions and actual number of cells observed in each stage of the cell cycle (2 pts)

Stage	Predicted %	Number of Cells	Total Cells Counted	Calculated %
Interphase			65	
Prophase			65	
Metaphase			65	
Anaphase			65	
Telophase			65	
Total	100%	65	65	100%

Questions

1. What stage of the **cell cycle** were most of the onion root tip cells in (1 pts)?

Is this what you would expect based on what you've read this week; why or why not? *Cite source(s) used* (1 pts).

2. How accurate were your predictions, based on your data, for each stage of the cell cycle (1 pts)?
3. What is the function of mitosis in an organism such as a human? *Cite source(s) used* (2 pts).

Experiment 4 Exercise 2: Meiosis

Review this week's reading in your book (pp 131-141) and this week's online lecture.

Then view the following animation before answering the questions below; be sure your audio is on:

McGraw-Hill Higher Education. 2006. How Meiosis Works

http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation_how_meiosis_works.html

Questions

1. Why is it necessary to reduce the chromosome number in gamete cells (egg and sperm), but not other cells of an organism? *Cite source(s) used* (2 pts).
2. Describe at least two differences between Meiosis I and Meiosis II in terms of what is **produced** and what occurs with the **chromosomes**. *Cite source(s) used* (2 pts).
3. If humans have **46 chromosomes** in each of their body cells, determine how many chromosomes you would expect to find in the following cells (4 pts):

Sperm	_____
Liver cell	_____
Daughter cell from mitosis	_____
Daughter cell from Meiosis II	_____

4. _____ are separated during Meiosis I, while _____ are separated during Meiosis II (2 pts).
 - a. Sister chromatids, sex chromosomes
 - b. Sister chromatids, homologous chromosomes
 - c. Homologous chromosomes, sister chromatids
 - d. Sex chromosomes, sister chromatids
5. At the beginning of meiosis I, cells are _____ and at the beginning of meiosis II, they are _____ (2 pts).
 - a. Diploid, diploid
 - b. Diploid, haploid
 - c. Haploid, haploid
 - d. Haploid, diploid

Experiment 4 Exercise 3: Karyotyping

Go to the following website:

The Biology Project. 1998. Karyotyping Activity

http://www.biology.arizona.edu/human_bio/activities/karyotyping/karyotyping.html

Procedure

- A. Read over the material on the first page and then click on **Patient Histories** (at the bottom of the page).
- B. Click on **Complete Patient A's Karyotype**. Note a single chromosome located to the left of the paragraph at the top. You need to match this chromosome with the appropriate pair.
 - a. Some of the chromosomes arranged beneath the paragraph are hyperlinked (have a blue line beneath them).
 - b. Click on the **hyperlink** associated with the matching chromosome.
- C. Record in **Table 2** below the correct match for this first chromosome (a).
- D. Continue until you have matched all chromosomes required. Note that the letters (a-e) correspond to the order that the chromosomes are presented.

Table 2. Patient A karyotype data (1 pts).

Chromosome Presented	Matches #
Chromosome a	
Chromosome b	
Chromosome c	
Chromosome d	
Chromosome e	

Questions

1. What notation would you use to characterize Patient A's karyotype? Be sure to read over the information presented so you know the correct **notation format** (1 pts).

2. Based on the table of possible chromosomal disorders displayed on the website, what diagnosis would you give patient A (1 pts)?
3. When during Meiosis does the error occur that results in this karyotype; be specific (1 pts)?

Procedure (continued)

- E. Click on the Patient History button (bottom of the page) and then click on **Complete Patient B's Karyotype**.
- F. Match the chromosomes presented as done in the previous exercise.
- G. Fill in the **Table 3** below, indicating how you matched up the chromosomes presented with the actual chromosomes in the karyotype.

Table 3. Patient B karyotype data (1 pts).

Chromosome Presented	Matches #
Chromosome a	
Chromosome b	
Chromosome c	
Chromosome d	
Chromosome e	
Chromosome f	
Chromosome g	
Chromosome h (This is a tough one)	

Questions

4. What notation would you use to characterize Patient B's karyotype (1 pts)?

5. What diagnosis would you give patient B (1 pts)?
 6. Why does this individual exhibit male characteristics and not female? *Cite your source* (2 pts).
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Procedure (continued)

- H. Click on the Patient History button (at the bottom) and then click on **Complete Patient C's Karyotype**.
- I. Match the chromosomes presented as done in the previous exercise.
- J. Fill in **Table 4** below, indicating how you matched up the chromosomes presented with the actual chromosomes in the karyotype.

Table 4. Patient C karyotype data (2 pts).

Chromosome Presented	Matches #
Chromosome a	
Chromosome b	
Chromosome c	
Chromosome d	
Chromosome e	
Chromosome f	
Chromosome g	
Chromosome h	
Chromosome i	

Questions

7. What notation would you use to characterize Patient B's karyotype (1 pts)?
8. What diagnosis would you give patient C (1 pts)?

9. Why might the risk of this disorder increase as a woman gets older? *Cite any sources used* (3 pts).
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Week 4 Experiment Grading Rubric

Component	Expectation	Points
Experiment 4 Exercise 1	Distinguishes among the various stages of the cell cycle and correctly answers the questions (Table 1, Questions 1-3).	7 pts
Experiment 4 Exercise 2	Demonstrates an understanding of meiosis and how it relates to sexual reproduction (Questions 1-6).	12 pts
Experiment 4 Exercise 3	Creates and uses a karyotype to diagnose genetic disorders (Tables 2, 3, and 4; Questions 1-9).	16 pts
TOTAL		35 pts