Biology Homework Week 2
Due Wednesday, October 3 – (I will collect them prior to the exam.)
Your responses should be relatively brief, providing only the necessary information to answer the question.

1. An *E. coli* is a rod-shaped bacterium about 2µm long. If you placed *E. coli* end-to-end, how many *E. coli* would it take to cross the center of the field of view when using the 100X objective? (Please base your calculation on the following information: when using the 4X objective and a 10X ocular, the diameter of the field of view measured 5mm.)

2. Darwin and Wallace's theory of evolution by natural selection failed to explain what?

3. Is evolution a random process? Explain your reasoning.

4. Provide an example to support the following statement: Natural selection does **not** occur in order to benefit a population or a species.

5. A true-breeding pea plant with wrinkled, yellow seeds was crossed with a true-breeding pea plant with round, green seeds. What are the genotypes of <u>all</u> the possible gametes that <u>one individual</u> from the F1 generation could produce?

6. What is the frequency of each phenotype in the F2 generation of a cross between two true-breeding parent pea plants, one with yellow seeds and the other with green seeds?

7. If a mother and father are heterozygous for a single given trait, what is the probability that they will produce an offspring that is heterozygous for that trait? If they are heterozygous for two different traits, what is the probability that they will produce an offspring with the same genotype?

8. A pea plant that is heterozygous for seed shape, seed color, and flower color was crossed with a true-breeding pea plant that produced round, yellow seeds and purple flowers (purple is dominant over white). What proportion of progeny will phenotypically resemble a) the first parent and b) the second parent?

9. In a certain plant, blue (B) flower color is dominant to white (b). You have a blue flowered plant and a white flowered plant.

a. What do you know about the genotype and phenotype of each plant?

b. After crossing the plants you find that all the offspring are blue. What have you learned about the genotypes of the original plants?

10. How is binary fission of bacteria similar to mitosis in eukaryotic cells? What is the major difference between these two processes?

11. Which of following statements about crossing over is true?

a. Chiasmata form between sister chromatids.
b. It occurs in prophase of Meiosis II.
c. It decreases the genetic variability of gametes produced by meiosis.
d. Chromosomes that result from crossing over have a mixture of paternal and maternal alleles.

12. In which stage of meiosis does a fruit fly have 8 chromosomes (see table 12.1 in your book)?

13. Cells from an organism with a diploid number of 6 undergo meiosis. Draw a sketch of a cell in metaphase I and a cell in metaphase II. Label your drawing appropriately.