1. Make sure your name is printed in the upper right-hand corner of each page.

2. Take off your hat or turn the bill around backwards.

3. Do not use red ink or red lead to complete this exam.

4. Keep your eyes on your own exam. Do not attempt to cheat in any manner.

5. Read each question carefully before you begin to answer.

6. Review all your answers before you turn in your exam.

7. Grades will be posted outside of Room 151 by Friday at 5. If you would like, give me a self-addressed, stamped envelope, and I’ll send your grade to you.

Good luck, and have a safe summer!
3 pts. For what two reasons are plants **essential** to your life?

a)

b)

5 pts. Answer these questions about **biomes** using the following key:

a) tundra; b) northern coniferous forest; c) moist coniferous forest; d) grassland; e) deciduous forest; f) desert; g) chaparral; h) tropical rain forest.

_____ the biome that is located at the highest altitudes of mountains in many parts of the world

_____ biome that has been mostly converted to cereal grain production and cattle grazing

_____ fires and inadequate rainfall prevent the establishment of trees in this biome

_____ biome with the greatest plant and animal diversity

_____ the two biomes with the most precipitation

2 pts. If you drove from New York City to San Diego, California, name four biomes that you would travel through (in order, **from East to West**).

a)

b)

c)

d)

6 pts. Use the following key to answer each of the questions below: a) bacteria, b) fungi, c) cyanobacteria, d) mosses, e) ferns, f) gymnosperms, g) angiosperms

_____ the group of plants with the fewest species

_____ one group that is heterotrophic

_____ two (2) of the four groups that have swimming sperm

_____ one group that has seeds

_____ the group that is both prokaryotic and autotrophic

4 pts. True or False. Evolution can happen very quickly (in one generation). (circle the correct answer)

True or False. Evolution always produces new species.

True or False. Evolution happens very slowly, if at all, when there is no genetic variation.

True or False. Although evolution is a good scientific theory, there is little evidence for evolution.

3 pts. Place the following events in their correct order (1 happened very long ago, 6 happened closer to today)

_____ first land plants, _____ first eukaryotes, _____ first multi-cellular organisms, _____ first flowering plants, _____ first vascular plants, _____ first photosynthetic organisms

2 pts. Consider a cell. Place the following in the order from the most (1) to the least (4) you would expect to find in a typical cell. _____ genes, _____ chromosomes, _____ alleles, _____ nucleotides

6 pts. Suppose you have one parent plant with fuzzy leaves and one plant with smooth leaves. When you cross them, all of their offspring are fuzzy.

First, what is the dominant characteristic?

What is the **genotype** of the fuzzy parent?

What is the **genotype** of the smooth parent?

What is the **genotype** of the F₁ offspring?

If you have 1000 F₂ offspring, how many fuzzy ones do you expect to find? (Show your work)
4 pts. For each of the following descriptions of flowers, indicate what kind of pollination agent pollinates the flowers.

- foul odor, trap blossom, no food provided, dutchman’s pipe
- yellow flowers, landing platform, nectar guides, nectar
- large white flowers, strong smell, abundant pollen and nectar
- pink flowers, long narrow tube with nectar at the end, odor

4 pts. For each of the following, (I showed a picture of each in class) name the kind of interaction.

- acacia tree and ants
- lichen
- mistletoe and tree
- spanish moss and a tree

4 pts. Suppose you are the first plant on a deserted island. Name two ways that you could reproduce by yourself—without any other plants of your kind around.

a)

b)

Now, explain what is the long-term disadvantage to both of these methods of reproduction.

3 pts. Suppose you have a cell with 30 chromosomes in it. At the end of meiosis, how many cells do you have, and how many chromosomes are in each cell?

3 pts. What is the function of a mushroom? (the part of the fungus you eat)

6 pts. Draw and label a flower showing that it is pollinated. Then, show how a sperm gets to an egg.
4 pts. Explain why meat is considered to be a luxury food (in terms of energy).

Explain why your use of gasoline currently helps to increase the price of meat (in terms of corn).

3 pts. Do you think that growing genetically modified foods is a good idea or not? Say yes or no, and then give three strong arguments that support your answer.
   a) 
   b) 
   c) 

4 pts. What makes a seed better than a spore?

What advantage do plants with vascular tissue have over non-vascular plants?

3 pts. Almost all plants and animals have sexual reproduction—what is so important about sexual reproduction?

4 pts. Every normal plant or animal has an even number of chromosomes in each of its cells. Explain how this might occur. (hint: think about how we get homologous chromosomes)

3 pts. Can we expect to solve the world’s food problems by harvesting food from the open ocean? Say yes or no, and then explain.

4 pts. Do you think that the grass family or the legume family is more important to human life on earth? Choose one, and then explain why that family is so important.
4 pts. On the last day of class, I showed a picture of wild banana fruits. What was unusual about these bananas, and what does this have to do with the problem related to the way we raise bananas today?

4 pts. Brussels sprouts, cabbage, cauliflower, and broccoli actually all belong to the same species, yet they look totally different from each other. How did they get this way---what was the process that allowed them to become so different? (Explain how these relatives became so different from each other.)

4 pts. At their house, Betty Sue and Jimmy Don use anti-bacterial soaps, anti-bacterial mouthwash, anti-bacterial toothpaste, anti-bacterial handi-wipes, and anti-bacterial cleaners. Is this a good idea or not? Say yes or no, and then explain your answer.

3 pts. What is the significance that hummingbird-pollinated flowers have inferior ovaries?

4 pts. In which population do you think that evolution would happen faster---a field of potato plants being grown by a farmer or a field of wild potatoes growing on their own? Choose one, and then explain your answer.
6 pts. What is the main function of photosynthesis?

What is the main function of photoperiodism?

4 pts. Is the process of aerobic respiration the same in you as in a plant? Say yes or no.

Are the four kinds of nucleotides the same in you as in plants? Say yes or no.

6 pts. What chemical elements make up sugar?
   a)  b)  c)

What do the biological molecules have to do with sugar?

What do ATP and the Calvin Cycle have to do with sugar?
   ATP—
   Calvin Cycle—

4 pts. Which of the following does not belong with the others? Circle one of the following: gibberellin, auxin, ethylene, chlorophyll

For the one you selected, describe its function.

9 pts. First, what do all of the following have in common: endodermis, vacuole, xylem, transpiration, succulence?

Next, explain what the main function of each is.
   Vacuole—
   Xylem—
   Transpiration—
   Succulence—

6 pts. Draw and label one leaf with the following characteristics: a compound leaf, net venation, stipules, axillary bud, and a petiole.

Is this a dicot or a monocot?
6 pts. Explain the relationship between a gene, an enzyme, and messenger RNA by describing what each does.

4 pts. In general, what is the importance of membranes to a plant cell? Describe what membranes do and two different places where you might expect to find membranes.

5 pts. Draw and label a cross-section of a tree that has been cut down showing the following: annual rings, spring wood, summer wood, sapwood, and heartwood.

Is this a drawing of primary growth or secondary growth?