**READING GUIDE:**

**Chapter 1: Introduction to Biology**

**1.2 The Process of Science**

1. What is a hypothesis, as defined in the book? (feel free to google other definitions)
2. What is a scientific theory, as defined in the book? (feel free to google other definitions)
3. If a ball is released in mid-air, what do you think would happen once released?
   1. You answer to this would be a **hypothesis**. You can be right or you can be wrong and an experiment can be designed to test that hypothesis
      1. A hypothesis does not have to be true, it is just one possible explanation for a cause and effect.
      2. An experiment would be to take a ball, hold it out at arm’s length and release the ball and repeat that 10 times, then average the results.
         1. There are situations where the results of your experiment would support your hypothesis and other situations where the results would not support your hypothesis. Try to think of several examples each where your original hypothesis would be supported or not supported.
   2. What knowledge and understanding did you use to generate your hypothesis?
      1. Mostly likely that knowledge and understanding came from the **theory** of gravity.
         1. Yes, gravity and its effects on objects is a theory. It is not just an opinion, it is a well proven set of ideas that has consistently been confirmed by many repeated observations.
4. Don’t worry about understanding the difference between deductive and inductive reasoning for the quiz, but make sure you still read the section anyway. Some of this will come into play in the lab.
5. What are variables and controls?
6. Make sure you understand how the scientific method is being applied in the “ART CONNECTION” box. You should know what example is being used to illustrate the scientific method.
7. Read the sections on: “basic and applied science” as well as the section “reporting scientific work” but don’t worry about the definitions or details, just try to understand the examples brought up and the general concepts.
   1. For sections such as these where I don’t expect you to remember specific details but I want you to read anyway, I still may have a question on the quiz about the reading. However, it won’t be details, it would be big picture. Such as:
      1. Which of the following was not discussed in the reading?
         1. Taxonomy as a way to categorize biological species
         2. Basic and applied science
         3. Scientific Method
         4. How Darwin laid the foundation of modern biology
         5. The process of publishing scientific findings

**Videos on Evolution and Natural Selection.**

**Evolution by Stated Clearly (8mins):** [**https://www.youtube.com/watch?v=GhHOjC4oxh8**](https://www.youtube.com/watch?v=GhHOjC4oxh8)

1. What is the definition of evolution given in this video?
2. When DNA is copied incorrectly and acquires errors, the genetic information changes. What do we call these changes? (around 2min mark in video)
3. What is the most recent common ancestor to all dogs? In other words, what organisms did dogs evolve from?

**Natural selection by Stated Clearly (9 mins):** [**https://www.youtube.com/watch?v=0SCjhI86grU**](https://www.youtube.com/watch?v=0SCjhI86grU)

1. What is meant by common descent?
2. What are the adaptations – which are traits – that were acquired by tortoises living on islands where their food grew in higher places?
3. What are some other foods related to broccoli and cauliflower?
   1. How did these related foods come to exist? How were they being selected?
   2. Remember, the trait must exist to be selected!!!
4. In natural selection, what is it in nature that selects traits? In other words, how does nature select traits?
5. How is natural selection defined in this video?

**Chapter 11. Evolution and Its Processes**

**11.1 Discovering How Populations Change**

1. Where is the place that Darwin observed various finches with interesting differences in their beak size and shape?
2. What are the 3 necessary principles that inevitably lead to natural selection? (try to summarize the text in a short phrase or sentence each).
   1. **These are very important!!!** Make sure you understand them as best as you can. For the quiz I won’t expect you to know exactly why these are so important because we will talk about them in lecture but you should be able to describe them briefly for the quiz.
3. Using those 3 principles, what did Darwin and Wallace claim? In other words, what is natural selection? Try to put this in your own words and make sure you understand what the concept actually means.
4. You should understand the results obtained by Peter and Rosemary Grant
   1. What was the data collected and what was the pattern observed in the results?
   2. What is the explanation of this pattern?
   3. Explain how this is an example of seeing natural selection in action.
      1. What are the characteristics that are advantageous during drought? Why is this not advantageous during years with normal precipitation?
      2. What are the characteristics that are advantageous during years with normal precipitation? Why is this not advantageous during years of drought?
5. What does natural selection absolutely need in order to occur?
6. What are the two main sources of genetic diversity?
7. What is an adaptation?
8. For this quiz, you do NOT need to know the terms: modern synthesis, microevolution, macroevolution, allele, allele frequencies, population genetics, gene pool, genetic drift, migration. I am including information below because they come up in the reading and often in other resources as well but you still do not need to know them for the quiz but you will need to learn them later, so not bad to learn now.
   1. FYI only: Alleles are different versions of a gene such as one version of an eye color gene can produce brown eye color whereas another version can produce blue eye color
   2. FYI only: Genotype just means the alleles a person inherited from their parents
      1. Since we get one eye color gene from both of our parents we have two alleles for eye color.
      2. Interestingly, someone that has inherited a blue eye color allele from one parent and a brown eye color allele from the other will have brown eyes with no trace of blue eye color. The blue eye allele is silent which we call recessive.
   3. FYI only: Phenotype just means what is the trait that is actually expressed as a result of the genotype.
      1. Using the same example, a person with an allele for both brown and blue eyes, will only have brown eyes. Brown eyes would be the phenotype.
9. I won’t quiz you on most of the “population genetics” section but I do want you to read the last paragraph on sexual selection