**Bozeman Science 030 – Advanced Genetics**

A. Introduction

1. What is mtDNA?

1. What are “linked genes”?

B. Independent Assortment:

1. What is independent assortment? All of these genes assort independently, meaning they cannot:

2. What is the interesting thing about the 7 characteristics Mendel studied?

3. Why does red hair and freckles tend to show up together?

C. Multiple Genes:

1. Height is caused by a number …

2. Why are there so many possibilities (8) of sperm/egg produced by a medium height individual in the example he gave?

3. When a trait shows a bell shape curve, then that is an indicator that it is caused by:

D. Sex-Linkage:

1. Morgan crossed (worked with):

2. Create the Punnett square of Color Blindness to the right:

3. Why is it rare to find a girl that is color blind?

E. Nonnuclear Inheritance:

1. Besides the nucleus, where else can DNA be found?

2. Where does all of our mitochondrial DNA come from?

1. What causes “variety” in our mitochondrial DNA?

**Bozeman Science 031 – Gene Regulation**

A. Introduction:

a. Gene regulation is how we express …

b. Terminology:

i. Regulatory Gene: secretes (codes for the formation of) a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that regulates

ii. Regulatory sequence: an example is a

c. For gene regulation: it starts with DNA that makes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which codes for

d. Though we can regulate a gene in any step along the way, most of the regulation is going to be from

e. An example in us, is the TATA Box, a regulatory sequence that allows RNA polymerase to

B. The lac Operon:

a. How many genes code for proteins to digest the lactose?

b. What happens at the promoter?

c. The operator sits right between

d. The repressor protein binds to the

e. If the repressor is attached operator then RNA polymerase

f. The lactose fits into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and it changes the shape of the protein.

g. Now RNA polymerase can transcribe the genes so that the lactose gets

h. If lactose is now all gone, the repressor will bind back on the

C. The trp operon:

a. How many genes?

b. When tryptophan (amino acid) is present, it fits into the repressor who then binds to the

c. If you have no tryptophan, the repressor changes it shape, and it no longer binds to the

D. In eukaryotes, we primarily use transcription factors:

a. Transcription factors can:

i. Allow RNA polymerase to

ii. Some TFs will actually hold RNA polymerase in

b. When the DNA folds back, with more TFs, it then activates the