Spring 2007 Biology 111 In-Class Exam #2 KEY – Classical Genetics

The in-class portion of this exam is designed so that you can complete it in 20 minutes, but you may use the full 50 minutes. There are 3 pages for this exam, including this cover sheet. You are not allowed to use your notes, old tests, the internet, or any books, nor are you allowed to discuss the test with anyone until the in-class exam is completed at 11:30 am on Friday March 2. You may use a calculator and/or ruler for both portions of the exam. The **answers to the in-class exam must be hand written very neatly. If I cannot read your writing, then you will lose points because I cannot determine whether you have the right answer or not**.

-3 pts if you do not follow this direction.
Please do not write or type your name on any page other than this cover page.
Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the pledge and sign:

Lab Question:

3 pts.
1) If the basic PCR product with zero repeats is 222 bp and the VNTR consists of the repeated sequence GAATTC, how many copies of this repeated sequence are in a PCR product of 300 bp? Write your answer in the box, and to get full credit, show your work here:

(300 – 222) ÷ 6 = 13

Answer
13

Lecture Questions:
6 pts.
2) List the mechanisms used in meiosis that result in diversity for the F1 generation.
Recombination/crossing over
Independent assortment
Multiple chromosomes

4 pts.
3) a. List the components needed to produce an RFLP?
DNA (chromosomal/genome)
Restriction enzyme
Gel and Southern blot
Probe

b. Which component is the hardest one to acquire and why?

Probe: you don't know which sequence will bind to the DNA of interest unless it is already a known gene. For CF, they had to guess.

4 pts.
4) In one sentence, what does the spliceosome do?

It cuts out the introns and splices together the exons in a pre-mRNA to help form a mature mRNA.

4 pts.
5) How many nucleotides are consumed to produce a mature mRNA derived from 5 exons (100 bases each) and 4 introns (40 bases each)? To get full credit, you must show your work of how you reached your numerical answer.

500 + 160 + 1 +200-300 (poly-A tail) = 861 or 961

3 pts.
6) Why is the mutanted glutamic acid #6 of β hemoglobin the sixth amino acid if it is encoded by the 7th codon?
The first amino acid (Met) is cleaved off after translation. Many people incorrectly said the start codon does not encode for an amino acid but it does – Met.

4 pts.
7) Draw a picture of the data produced by Sato and Sato that was key to discovering the molecular basis for cystic fibrosis.
Looking for a set of two graphs from wt and CF cells, +/- cAMP and the amount of Cl- secreted.

3 pts.
8) In two sentences or less, what is the difference between an enhancer and a promoter?
Both are DNA sequences that regulate transcription, so the differences are the particular sequences, the distance from the start transcription site, and the transcription factors that bind to them.

3 pts.
9) A pair of white bunnies mate. The female has a brown nose and the male has a brown tail. All their babies are white with brown tails and brown noses. All their grandchildren (all 100 of them) have either only brown noses or only brown tails, with both sexes showing equal frequency of the two distinct coloration patterns. Are these two loci link? How can you know?

They are linked because only 2 phenotypes are present in the F2 instead of the possible 4.