

**Biology 1A - Lab Exam #1 - Oct. 19<sup>th</sup>, 2007****Answers Exam 1 Bio 1A, Fall 2007**

1	C	6	D	11	B	16	B	21	E	26	B
2	C	7	A	12	E	17	A	22	D	27	C
3	B	8	B	13	A	18	E	23	D	28	A
4	D	9	E	14	A	19	C	24	A	29	A
5	D	10	C	15	D	20	C	25	B	30	B

Mean = 66.2, STDEV = 15.4. A grade  $X \geq 83$ , A- 79-82.5, B+ 73-78, B 69-72.5, B- 65-68.75, C+ 62 - 64.75, C 57 - 61.75, C- 50-56.75, D+ 47.5 - 49, D 44 - 47, D- 41.5-43.5, F  $X < 41$ .

- 2) Acetone separates pigments from their associated proteins and normal resonance energy transfer can not occur.
- 3) Once the chromatids separate they are chromosomes. Thus during anaphase you double the number of chromosomes to 8 and this is 2 times as much DNA as before (2C).
- 5) In the presence of methylamine no proton gradient can be established and no ATP can be made via chemiosmosis.
- 6) Since the cell is G2 this means 4C thus a sperm would have  $0.6 \times 10^{-12}$  grams of DNA.  $0.6 \times 10^{-12} / 600$  grams/mole bp =  $0.1 \times 10^{-14}$  moles bp and then times  $6.0 \times 10^{23} = 0.6 \times 10^9 = 6.0 \times 10^8$ .
- 7) Note the units. The activity doesn't change per ng of enzyme (as long as you have excess substrate).
- 9) 10 cells each having 46 chromosomes with each chromosome consisting of two DNA strands yields 920 strands. Each of the two strands of each chromosome is unique DNA sequence (complementary strands are not the same sequence unless it is a palindrome and you would never have a palindrome the length of a human chromosome (essentially millions of bp long).
- 10) Since green light is absorbed minimally you would not expect oxygen to be produced at that portion of the filament and hence a minimal number of bacteria would be present.
- 11) This is a pre-lab question. Log of 0.1 is -1 but you need to change the value to make it positive 1.
- 14) A 10 fold dilution means the original solution is 10x more concentrated than the measured sample. The measured sample is 50 mM so the original is 500 mM which is 0.5 M.
- 20) This was the only known value when calibrating the measuring device and also when you measured the field of view.
- 21) High salt = high affinity, low salt = low affinity for any type of DNA. The bacteria were lysed by the presence of SDS and NaOH. It was stressed in lecture that it was important that the bacterial DNA be pelleted before adding the supernatant to the column.
- 30) The chance that Sally's mother is a heterozygote is 50% and the chance that Sally is a carrier if her mother is a heterozygote is 50%. Thus together her chance is 25%.

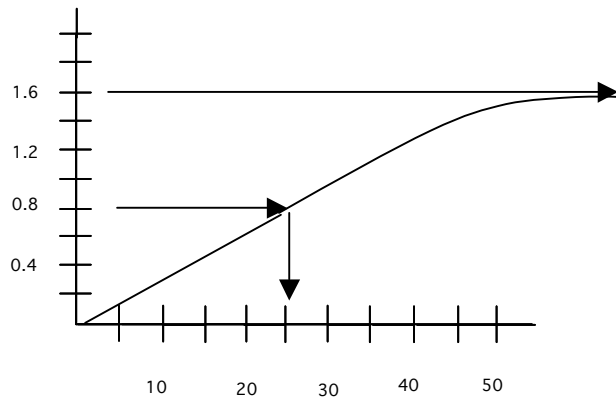
**Short Answer**

1. Last name and initial had to be on each page.
- 2.
- a) At least **4** (1 Locus represented by mutants 1,2,4. Another locus represented by mutants 3,5,9 & 10. Another locus represented by mutants 7 & 8. Another locus represented by mutant 6).
- b) Mutants 3,5,9 & 10. **NO PARTIAL CREDIT. ALL OR NONE.**
- c) Starting with M3 the vertical arrow (M1) needs to be shaded in all the way down to the end.
- 3
- a) Size =  $1 / (\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}) = 1 / (1/256) = 256$  They do not need to solve the equation.
- b) Size =  $1 / (\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}) = 1 / (1/4,096) = 4,096$  (about 4,000 is okay).
- c) 256 (see 3a). Note that every time MLul cuts BstU1 also cuts the same sequence because BstU1 has the same palindrome within MLul. There are times when BstU1 cuts and MLul does not. Thus the sizes of the double digest are exactly the same as with BstU1 alone.
4. Organic solvent and P2 is the 2<sup>nd</sup> band from the top.
5. 1 pt for  $X^{wsn}$   
1 pt for Y

Note that both w and sn should be lower case. Wrong case then take off 1 pt.

6.  
a)

1 pt for Y axis labeled as Absorbance (O.D. units). They need include O.D. units.



b) Affinity is 1 over Km, thus it is 1/25 mM (S).

7. a) Note the G must be upper case.

**G<sup>+</sup>**  
**G**

b) ¾ or 75 %  
c) 0 % or 0/4

1 pt for X axis labeled as mM S (S stands for substrate).

8.

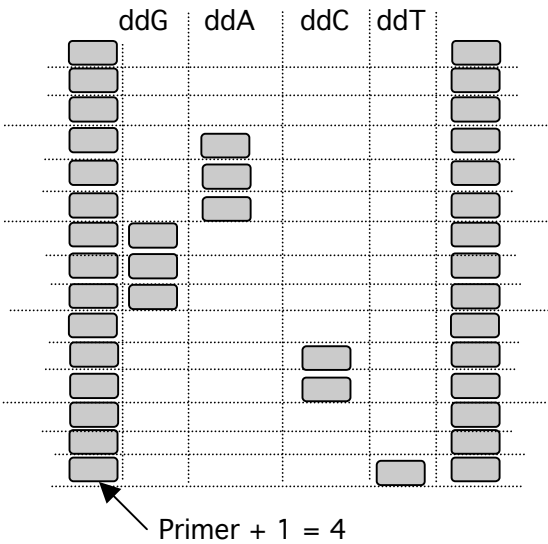
	P 0.4 D <sup>+</sup> e	P 0.4 D e <sup>+</sup>	r 0.1 D <sup>+</sup> e <sup>+</sup>	r 0.1 D e
P 0.4 D <sup>+</sup> e	NO	NO	NO	YES = 0.04
P 0.4 D e <sup>+</sup>	NO	NO	NO	NO
r 0.1 D <sup>+</sup> e <sup>+</sup>	NO	NO	NO	NO
r 0.1 D e	YES = 0.04	NO	NO	YES = 0.01

**½ X 0.09**  
↑    ↑    ↑

1 pt, 1 pt, 2 pts

For the 2 pts they need to show the work, Punnett Square.

9. 1 pt per lane. NO PARTIAL CREDIT.



10. P1 White lawn for the 2<sup>nd</sup> column. P2 White colonies for the first column and white lawn with blue colonies for the 2<sup>nd</sup> column.

11. 3 pts if circular, 2 pts if linear. The first lane indicates circular DNA.