Name: _____   Group: _____   Date _____

Instructor/section _____/_____   Lab day (circle) **M Tu W Th Sat**

Problem #1B (6 points)

Convert the measurements given below to the indicated metric units. (1 pt each)

	Weight of object	Volume of Liquid	Length of Cardboard
original measurement	**47.38 g**	**83.5 ml**	**26.1 cm**
	_____ mg	_____ dl	_____ mm
	_____ µg	_____ L	_____ km

Problem #2B (8 points)

Diagram the ***complete*** *structural formula for the dipeptide your group assembled earlier on the group exam* ***(4 pts)****.* *Circle and label the* ***amino group, carboxyl group****, both* ***"R" groups,*** *and the* ***peptide bond (4 pts)****.*

Indicate the amino acids (in order) of your dipeptide here: _____ - _____

NOTE: Be sure to turn your group's dipeptide model in to your instructor once everyone has completed the exam.

Problem #4 (14 points)

A. The activity of Enzyme X was tested at the pH values indicated in the table below. First, determine the H^+ and OH^- concentrations for each pH value and enter them in the table: (4 pts)

	Tube #1	Tube #2	Tube #3	Tube #4
pH value	7	5	3	9
H^+ concentration				
OH^- concentration				
Enzyme X activity	0	4	2	0

What is the ***independent* variable** in this experiment? _____ **(1 pt)**

What is the ***dependent* variable** in this experiment? _____ **(1 pt)**

B. **Next, use the grid below to graph Enzyme X activity in relation to pH using the values in the table above. (6 pts)**

C. According to the data, at which pH value is Enzyme X activity the *greatest*? **(2 pts)**

Problem #5 (9 points)

You plan to test the hypothesis that students who don't work while attending school perform better than students who do work. To do so, you recruit 75 students in the same academic program at LAMC who will be taking the same 3 courses in the coming semester. Of these students, 25 will not work at all during the semester, 25 will work 20 hours per week, and 25 will work 40 hours per week. At the end of the semester you will have access to the overall percent scores for each student in each course.

A. What is the ***independent variable*** for this experiment? **(2 pts)**

B. What is the ***dependent variable*** for this experiment? **(2 pts)**

C. What is the ***control*** for this experiment? **(2 pts)**

D. Indicate one ***standardized variable*** for this experiment? **(1 pt)**

E. To graph the results for this experiment, which variable is plotted on the ***horizontal (X) axis***? **(1 pt)**

F. Which variable is plotted on the ***vertical (Y) axis***? **(1 pt)**

Problem #6 (12 points)

A. The DNA sequence below is the coding strand of a gene. Write the sequence of the complementary ***template*** strand and be sure to label the 5' and 3' ends. **(4 pts)**

(*coding strand*) **5' – CGGAATGAATCGGCTACGCATCTGCAGTTGTTAAGT – 3'**

B. Write the ***mRNA*** sequence transcribed from this DNA sequence and indicate the 5' and 3' ends. **(4 pts)**

C. Identify the start codon and indicate the ***amino acid sequence*** encoded by the mRNA above. **(4 pts)**

Problem #7 (16 points)

Color-blindness is due to an *X-linked* **recessive** allele. A woman with normal color vision gives birth to a girl who turns out to be color-blind. Her husband has normal color vision. The woman's father is color-blind and her mother has normal color vision. The husband's father is color-blind and his mother has normal color vision. Based on the phenotype of the girl, the husband believes he is *not* the father.

    A. Draw a pedigree with all the family members referred to above. Shade the symbol for all color-blind individuals and indicate the genotype of each person (indicate unknown alleles with a "?"). **(7 pts)**

    B. Use a Punnett square to determine the probabilities of all possible phenotypes for the children of this couple. **(6 pts)**

    C. Indicate whether or not the husband could be the father and ***qualify*** your answer. **(3 pts)**

Problem #8 (9 points)

A fish population contains dark, medium and light blue phenotypes due to a single gene with only 2 different alleles, **B** (dark blue) and **b** (light blue), which exhibit incomplete dominance. The percentages of each phenotype are shown below for 3 generations. Determine the allele frequencies for each generation to the nearest hundredth (e.g., 0.51): **(6 pts)**

	Generation 1	Generation 2	Generation 3
dark blue	26%	38%	49%
medium blue	46%	44%	40%
light blue	28%	18%	11%

B = _____   **B** = _____   **B** = _____

b = _____   **b** = _____   **b** = _____

Indicate whether or not this population is evolving or in equilibrium, and be sure to *qualify* your answer. **(3 pts)**