Exam Answer Assessment Rubric

Criteria for a Grade of:

“A” Your response consists of clear concise and insightful points that are substantiated by details of both content and context. ALL essential terms relevant to the answer are presented and correctly used. No extraneous material is included. The sequence of phrases and/or sentences flows effortlessly and indicates a high level of organization, preparation, and effort. All words are legible.

“B” Your response consists of clear concise and insightful points that are mostly substantiated by details of both content and context. However, you will receive a “B” if essential terms or ideas relevant to the answer are vaguely or incompletely presented, or omitted. Or, if extraneous material or digressions are included, or if the answer is mostly complete, but clearly lacks organization, you will receive a “B.” Lastly, if there are illegible words within an otherwise mostly complete answer, you will receive a “B,” since I cannot tell if these illegible words contain material that is relevant.

“C” Your response includes most of the major points to answer the question, however, critical supportive details, terms, explanations, etc. are incomplete or lacking. You will also receive a “C” if the flow of information is choppy and lacks a rigor of focus and/or contains irrelevant information as filler. You will also receive a “C” if basic information is presented accurately but with little synthesis or insight. For example, simply listing terms without explanation when a question asks you to “List AND briefly explain...” will earn you a “C” for that response. As another example, omitting a figure when one is asked for will earn you a “C.”

“D and below” Your response contains major content, contextual and/or logical flaws, and/or critical components of the answer are omitted. Key terms, if present, are imbedded in glaring misconceptions. Few points are made beyond the obvious, and/or for essay responses, the flow of information is very choppy, poorly connected, and suggests a lack of preparation for that question.

“0” You left a question blank.

1a. Briefly list the steps that are involved in deriving the allometric relationship between metabolism and body mass for these data. 
   5 pts

1b. Goto a computer and log onto http://www.science.widener.edu/~grant/courses/bio401/assignments/bio401assign10a.html … where you will see these data. Use excel to derive and display the allometric relationship between metabolism and body mass for these data. Print it out and submit it as your answer to this part of the question. Make sure your secret ID # is on the page.
   12 pts

2. Below is the oxygen dissociation curve of an adult human at 37°C and pH 7.4. On this graph draw and clearly label 4 additional curves:

   A) dissociation curve for myoglobin
   B) dissociation curve for a fetus
   C) dissociation curve at 37°C but pH 7.2
   D) dissociation curve for pH 7.4 at 39°C.

   For each (A)-(D), in the spaces provided on the next page, explain your justifications for the shapes and locations on the graph for each of these curves
   20 pts
3. While walking on the treadmill, a person is consuming 1.4 liters of oxygen per minute and produced 1.08 liters of CO₂ per minute. What is the energy expenditure per minute and the RQ? Please, show all work. 

Extra Credit BONUS: What are the percentage contributions of carbohydrate and lipids to the person’s energy expenditure? Please, show all work.

4a. Does this figure depict the relationship between X and Y for an ectotherm or endotherm? Please explain exactly how you can you tell which?

4b. Please, label the X and Y axes including the units.

4c. What does each the numbered section/point on the graph indicate?

1 – 2 pts
2 – 2 pts
3 – 2 pts
4 – 2 pts
5 – 2 pts

5a. Draw a graph, using the axes below, that illustrates the Q₁₀ effect. Label the axes.

5b. If at T₁ = 10°C, the metabolic rate is MR₁ = 81 µ gm⁻¹hr⁻¹ and at if T₂ = 20°C, the metabolic rate is MR₂ = 126 µ gm⁻¹hr⁻¹ and since the formula for Q₁₀ is found from MR₁ = MR₂ * Q₁₀ ^[(T₂ - T₁)/10] find the Q₁₀: {please show all work}

6 pts

6a. Please offer a reasonable biological scenario by which this adaptation could have evolved in dolphins by natural selection.

6 pts

7. Consider the graph at right, which shows the cooling curves for two identical lizards (A and B). Both started at 43°C and are cooling toward 22°C.

Lizard A moved from a sunny hot place to a cool crevice with still air, whereas lizard B moved from the same sunny hot place to a windy shady place exposed to the deep blue desert sky.

Use your knowledge of biophysical ecology (and all of the terms in the box at right below) to explain why Lizard B cools faster than Lizard A.

12 pts

body temperature, \( T_b \)
boundary layer
conductance or insulation
conduction
convection
evaporation
heat transfer
operative environmental temperature, \( T_e \)
radiation, visible and thermal infrared
spectral absorptivity