

Instructions:

This exam is in 2 parts: Part 1, Questions #1-8, you should complete in this room, and Part 2 , Questions #9-10, to be completed using the displays in Room 426.

**PLEASE ATTEMPT ALL QUESTIONS, SINCE WE OFFER
A GREAT DEAL OF PARTIAL CREDIT.**

PLEASE WRITE LEGIBLY

PACE YOURSELF !!!!! By 12:30 you should have finished half of this exam.

For short answer questions, the space provided for an answer tells much about how much text is necessary and sufficient for each answer.

Please fill but do not exceed the space provided.

Read the questions carefully. When a question asks for a “list” then just make a list, and when it says “state” then write a statement. However, when it says “explain” you will need to have verbs in your sentences.

Think before you write and economize on your prose.

Please do not waste words in your answer by repeating the question.

NAME _____

Signature _____

Please sign here if you agree that you have **NOT** discussed the contents of the exam given on Tuesday with ANYONE who has direct or indirect knowledge of what was on the Tuesday exam.

SECRET ID _____

Pick any non-trivial 8 digit number and copy this number to the top of page 1 of the answer sheets to this exam.

Please note that under Widener University Academic Rules and Regulations,
Section G. Cheating and Academic Fraud

part 1 "Definitions. Academic fraud consists of any actions that serve to undermine the integrity of the academic process, including unauthorized inspection or duplication of test materials, cheating, attempting to cheat, or *assisting others to cheat* in a classroom test, take-home examination, or final examination, post-test alteration of examination responses, plagiarism, electronic or computer fraud, or comparable acts...."
part 2 "Penalties. The minimum penalty for individuals convicted of academic fraud shall be failure in the course...."

Exam Short Answer Assessment Rubric (assuming a 0-5 point scale)

Criteria for a Grade of:

- “5”** 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.
- “4”** 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 “4” 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 “4.” Lastly, if there are illegible words within an otherwise mostly complete answer, you will receive a “4,” since one cannot tell if these illegible words contain material that is relevant.
- “3”** 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 “2” 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 “2” 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 “2” for that response. As another example, omitting a figure when one is asked for will earn you a “2.”
- “2-1”** Your response **contains major content, contextural 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.**

SECRET ID # _____

Question Set 1.

- (a). Please briefly compare and contrast the concepts of Homology and Analogy. Please cite examples in your answer.

(5 pts)

- (b). Why is it critical to identify and use only “shared derived characters” when constructing a phylogenetic tree to depict the evolutionary relationships among a group of animals?

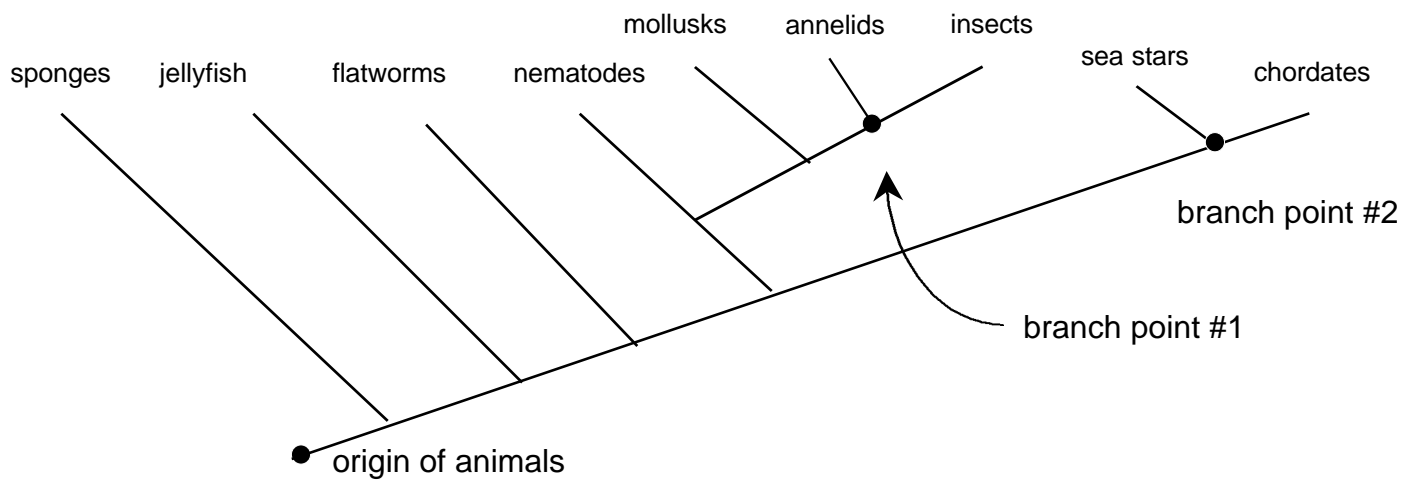
(5 pts)

- (c). We have mentioned several times in class that the concepts of “Developed” and “Evolved” are NOT the same. Please explain the principal differences between these terms and use examples to explain the correct usages of each term.

(6 pts)

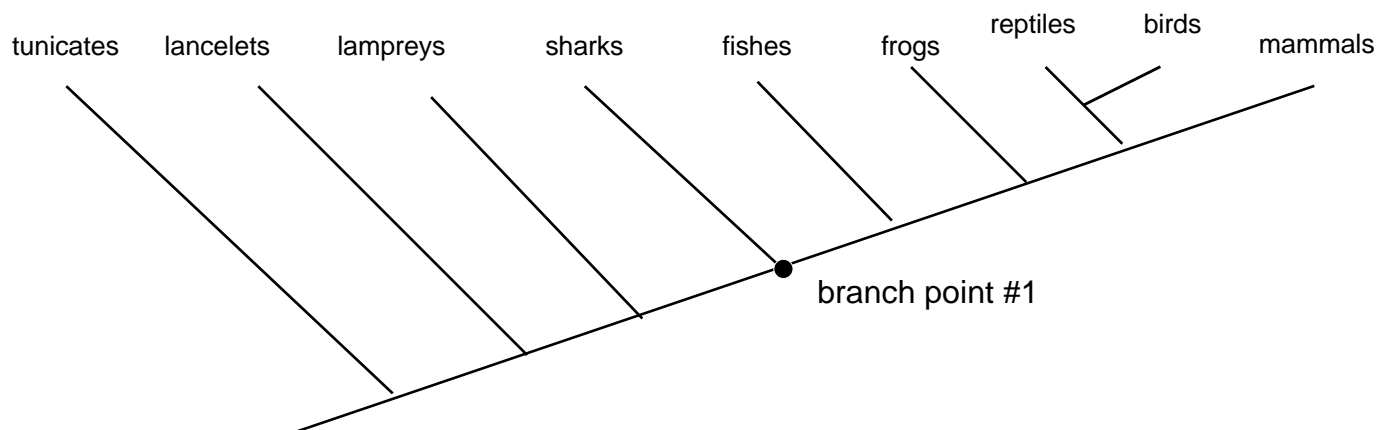
Question Set 2: Skeletal Muscular.

Consider the diagram below showing the evolutionary relationships among the major groups of animals:



- (a). At the origin of animals, the first animal species lacked tissues and were solely supported by a hydrostatic skeleton. What is an hydrostatic skeleton and how common is it throughout the animal kingdom? (2 pts)
- (b). Branch point #1 marks the evolution of what aspect of the skeletal system? This characteristic is found in all animals that derive to the RIGHT (insects) and is lacking in animals that derive to the LEFT (annelids). (2 pts)
- (c). Branch point #2 marks the evolution of what aspect of the skeletal system? This characteristic is found in all animals that derive to the RIGHT (all chordates) and is lacking in animals that derive to the LEFT (all sea stars). (2 pts)

Consider the diagram below showing the evolutionary relationships among the major groups of chordates:



(d). Branch point #1 marks the evolution of what major aspect of the skeletal-muscular system? This characteristic is found in all animals that derive to the RIGHT (fishes and up) and is lacking in animals that derive to the LEFT (sharks).

(2 pts)

(e). What is the adaptive significance (i.e. evolutionary advantage) of this character to the evolution of faster and more agile swimming?

(2 pts)

(f). In general, what is the ecological problem the skeletal system is designed to solve, AND briefly describe the three different solutions to this problem found in the Animal Kingdom.

(6 pts)

Question Set 3: Circulatory and Respiratory Systems.

- (a). Compare and contrast the circulatory and respiratory systems of a bird (a chordate) versus a grasshopper (an insect).

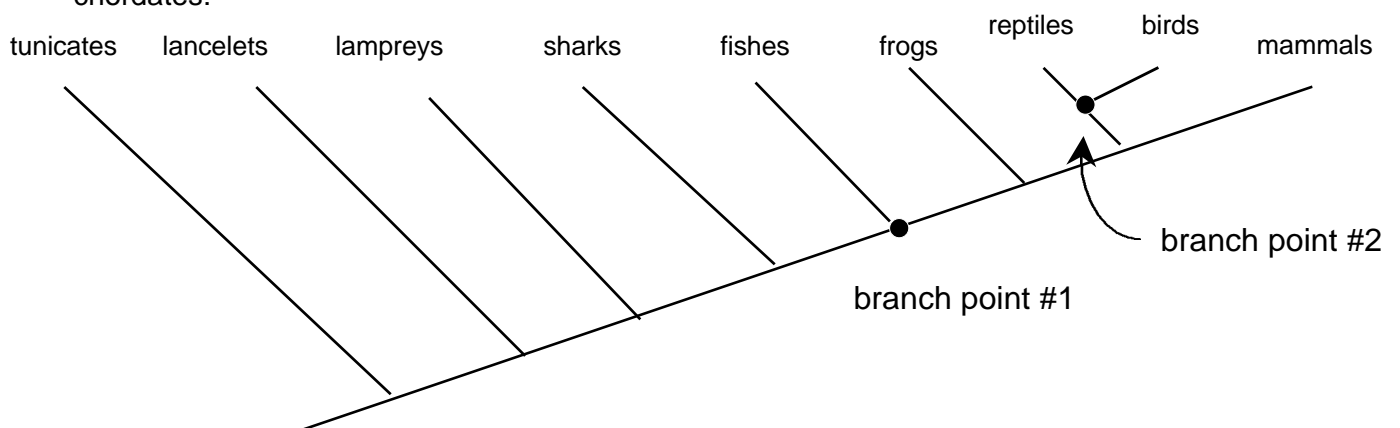
Circulatory differences

(2 pts)

Respiratory differences

(2 pts)

Consider the diagram below showing the evolutionary relationships among the major groups of chordates:



- (b). Branch point #1 marks the evolution of what major aspect of the Circulatory and Respiratory systems? These characteristics are found in all animals that derive to the RIGHT (frogs and up) and are lacking in animals that derive to the LEFT (fishes).

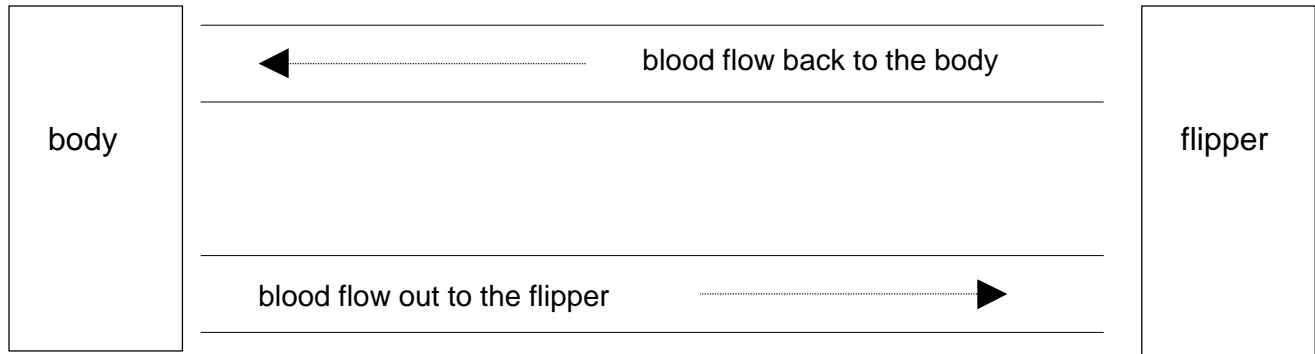
(2 pts)

- (c). Branch point #2 marks the evolution of what major aspect of the Circulatory and Respiratory systems? These characteristics are found in all animals that derive to the RIGHT (birds) and are lacking in almost all animals that derive to the LEFT (reptiles).

(2 pts)

- (d). In a counter current heat exchanger (such as in the flipper of a seal diagrammed below), indicate the direction of HEAT flow by writing little arrows directly on the sketch below.

(2 pts)

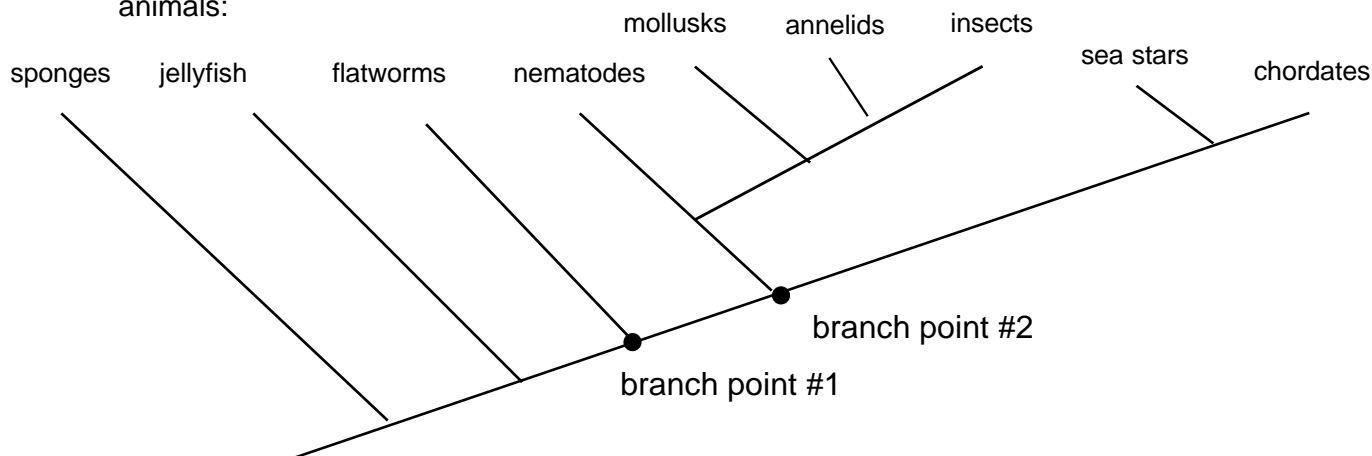


- (e). Please diagram AND explain how the fish gill is designed to obtain the maximum amount of oxygen from the water as it flows past the lamellae of the gill filaments. You MUST use a diagram in your explanation.

(6 pts)

Question Set 4: Digestive System.

Consider the diagram below showing the evolutionary relationships among the major groups of animals:



- (a). Branch point #1 marks the evolution of a one way flowing gut. What are the advantages to this design over that of the blind sack gut of earlier animals?

(4 pts)

- (b). Branch point #2 marks the evolution of what aspect of the digestive system? What are the major digestive system characteristics of animals found to the RIGHT(deuterostomes) versus to the LEFT (protostomes).

(2 pts)

(c). Please name and describe the role of three major associated digestive organs that are NOT part of the gut tube in mammals (i.e. not the esophagus, stomach, intestines, etc.).

(5 pts)

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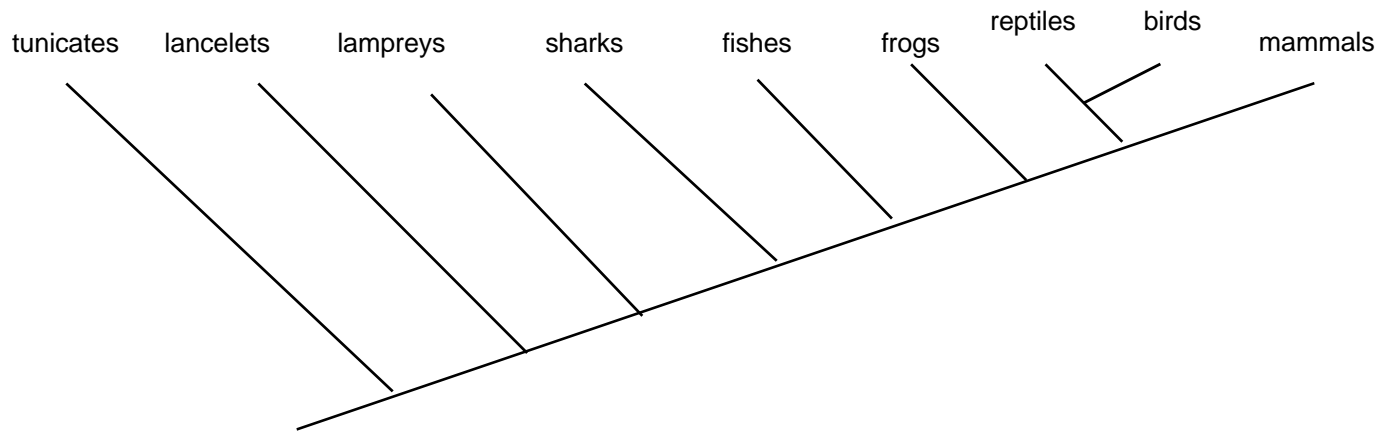
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(d). Please diagram AND describe the key aspects of the structure and function of the stomach of a ruminant herbivorous mammal.

(5 pts)

Question Set 5: Sensory and Neuro Endocrine Systems.



(a). Please explain what are the major evolutionary trends in sensory and nervous system design among chordates?

(8 pts)

PLEASE SELECT ONE OF THE FOLLOWING QUESTIONS AND ANSWER IT IN THE SPACE BELOW.

- (b). Please briefly explain how a nerve axon conducts a nervous signal. You MUST use a sketch of a nerve axon in your answer.
 - (c). Please briefly explain how a nervous signal is conducted across a synapse between two nerves. You MUST use a sketch of a nerve synapse in your answer.
 - (d). What is a hormone? How do hormonal “messages” differ from nervous signals? Describe the function, source, and target organ(s) of one hormone in detail.
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(8 pts)

_____ ← question you are answering

Question Set 6: Excretory and Reproductive Systems.

(a). Briefly explain what are the two major problems solved by the excretory system?

(4 pts)

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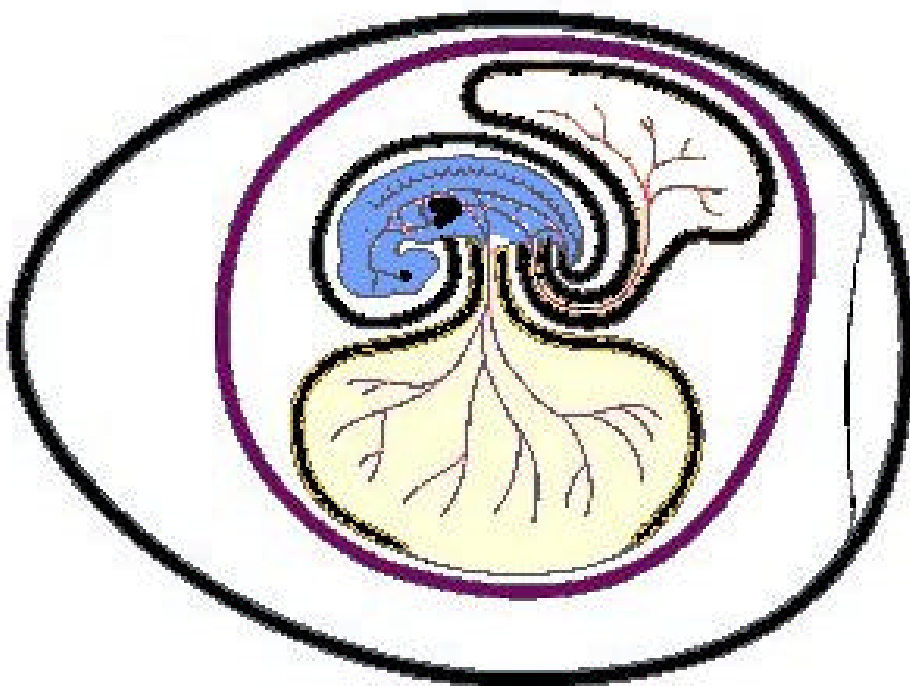
(b). Please sketch and briefly explain the role of the Loop of Henle in the mammalian Kidney in producing a concentrated urine. ALSO, explain why rodents that live in deserts have such long Loops of Henle compared to similar rodents in Pennsylvania.

(4 pts)

- (c). The trend from external to internal fertilization has been cited as a major evolutionary trend in reproduction among animals. Why might internal fertilization be advantageous? (4 pts)

- (d). On the diagram below of an amniotic egg, label the following (neatly connect an arrow from the word at left to the correct feature in the graphic at right):

(4 pts)



albumin
allantois
amnion
chorion
embryo head
heart
shell
yolk sac

Question 7: WHAT SYSTEM DID YOU STUDY? _____

What is the one really good question ON YOUR SYSTEM that you were prepared to answer that we did not ask you? And, what is the answer to that question?

(a). the ESSAY question we didn't ask ON YOUR SYSTEM -

(note: think carefully about what question you put down here – it must be a question that warrants a detailed response of at least $\frac{1}{2}$ a page. Your maximum score for part (b) will depend on the degree of difficulty of the question you ask here [just like diving!])

(6 pts)

(b). its answer -

(10 pts)

Question 8: What is the one really good question ON A SYSTEM **OTHER THAN YOUR STUDY SYSTEM** that you were prepared to answer that we did not ask you? And, what is the answer to that question?

(a). the ESSAY question we didn't ask on a DIFFERENT SYSTEM –

(note: think carefully about what question you put down here – it must be a question that warrants a fairly detailed response of at least $\frac{1}{2}$ a page. Your maximum score for part (b) will depend on the degree of difficulty of the question you ask here [just like diving!]))

(6 pts)

(b). its answer -

(10 pts)