Frog External and Internal Dissection Lab Packet Name:_____

*Due Date:*_____ Date:_____ Period:_____

Frog External Anatomy

Introduction

Frogs are a part of the phylum Chordata and the class Amphibia. As chordates, they have a notochord during an early embryonic stage and pharyngeal pouches until they develop from a tadpole into an adult. Unlike salamanders and newts, frogs and toads will lose their tales as they become adults. Like most other members of Chordata, they are vertebrates; this means they have a backbone, replacing the notochord, which protects their spinal column. Amphibians are closely tied to water throughout their life cycle, and therefore lack scales which evolved in reptiles to prevent desiccation.

Body Plan/Movement

Like all chordates, amphibians exhibit bilateral symmetry. Adults are tetrapods that use all four limbs to move in a variety of ways. They have strong **hindlimbs** for swimming, climbing, and jumping; they utilize their **forelimbs** to aid in gripping surfaces. **Digits** are present in both their fore- and hindlimbs; the digits on their hindlimbs are modified with webbing in between them to aid in swimming.

Feeding

Tadpoles need to feed constantly to support their rapid growth; they consume either by filter feeding or by grazing on algae. As adults they are strictly carnivorous and will consume anything they can catch. They are equipped with long sticky **tongues** to help capture insects into their mouths. The frog's mouth consists of two parts, the **maxilla** (upper jaw) and the **mandible** (lower jaw). Located on the maxilla are **vomerine teeth** and **maxillary teeth** that are located along the outer ridge of the maxilla. They do not chew their food, however these help prevent the escape of prey out of the animal's mouth. Their food is swallowed into the **esophagus**, a large, horizontal opening at the back of the mouth.

Response

Amphibians' eyes are large and can move in their sockets; they are covered by a transparent flap of skin known as the **nictitating membrane**. This membrane can be closed over the eye to help protect it while underwater and to keep moisture in while on land. Frogs can detect sound waves through their **tympanic membranes**, allowing them to better communicate and sense their environment while both on land and under the water.

Respiration

Gas exchange can occur through the **epidermis** (skin) in both tadpoles and adult frogs. Adult frogs are also equipped with **lungs**. Gasses taken in through their **external nares**, which enter mouth cavity through the **internal nares**. From the mouth, the air travels through the **glottis** to enter the lungs.

Excretion

Frogs eliminate waste through their **cloacal opening**; this is found between their hind legs.

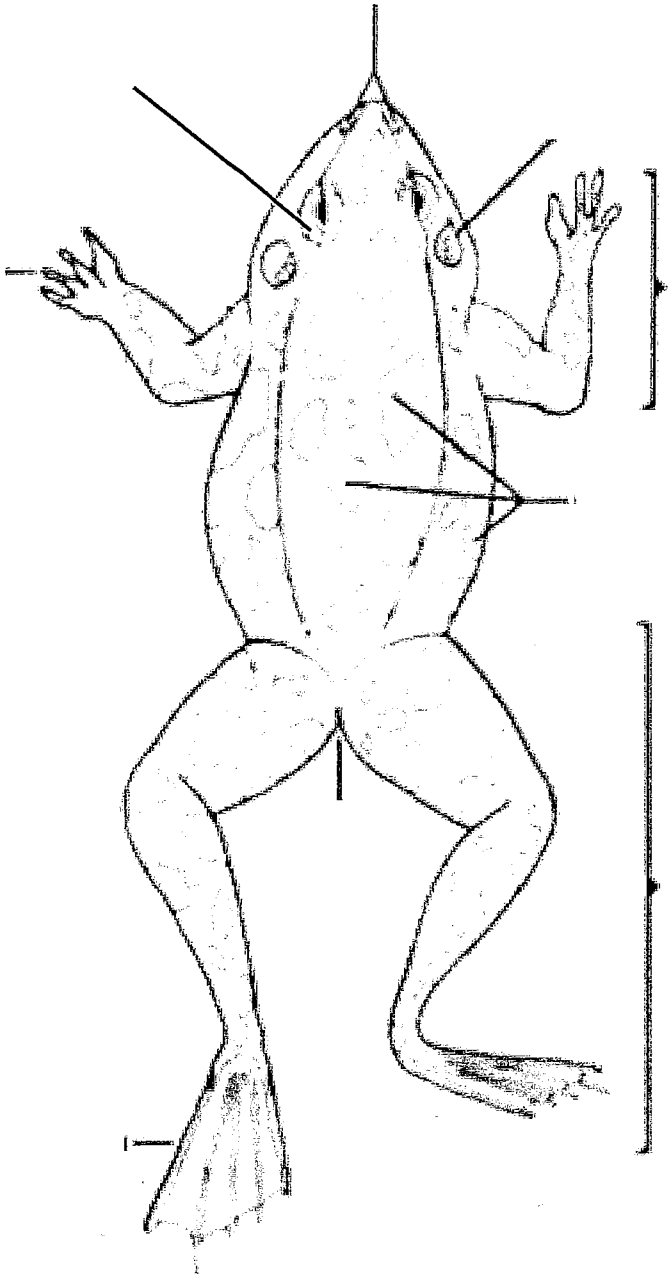
Reproduction

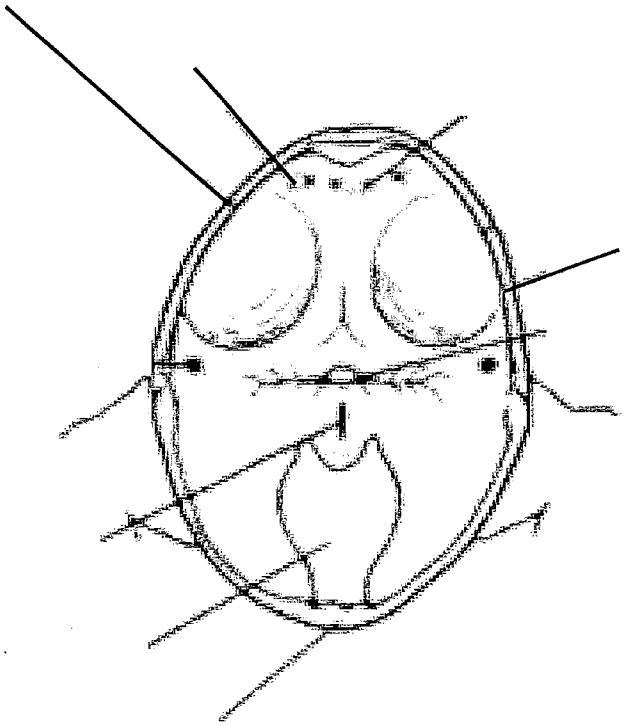
Frogs have individual sexes and carryout external fertilization. The male will initiate the release of eggs from the female's cloacal opening by squeezing her. As the eggs are released, he ejects his sperm, from his cloacal opening, to fertilize them.

Frog External Anatomy Coloring/Labeling Diagram

With the aid of the separate frog dissection lab instructions and the above informational paragraphs, label and color the list of structures below, be sure to use different colors for each structure.

- Hindlimbs
- Forelimbs
- Digits
- Tongue
- Maxilla
- Mandible
- Vomerine teeth
- Maxillary teeth
- Esophagus
- Nictitating Membrane
- Tympanic membrane
- Epidermis
- External nares
- Internal nares
- Glottis
- Cloaca





Amphibian External Anatomy Information Tables: Use the information provided above and in the frog dissection instruction sheet to fill in the table to keep track of important structures, their functions, and applicable body processes and/or organ systems.

Structure:	Function:	Body Process:
Hindlimbs		
Forelimbs		
Digits		
Tongue		
Maxilla		
Mandible		
Vomerine teeth		
Maxillary teeth		
Esophagus		
Nictitating Membrane		
Tympanic membrane		
Epidermis		
External nares		
Internal nares		
Glottis		
Cloaca		

Frog Internal Anatomy

Digestive System

As tadpoles their intestines are much longer than when they are adults; this facilitates the breakdown of plant material. As adults, frogs are strictly carnivorous, therefore they digestive systems transform to become shorter and simpler. In an adult, food travels from the mouth into the **esophagus**, who brings it to the **stomach**. As a muscular organ, the stomach will mechanically break down the food and begin chemical digestion through the use of digestive enzymes. Some of these enzymes are produced and secreted from the **pancreas**. To aid the breakdown of fats, bile is made in the **liver**, stored in the **gallbladder**, and used in the **duodenum** of the **small intestine**. The lower portion of the small intestine, which is highly coiled, is known as the **ilium**. It is held together by a clear, highly-vascularized membrane known as the **mesentery**. Chemical digestion and absorption of nutrients continue throughout the length of the small intestine. Water absorption and the collection of waste occurs in the **largest intestine**/colon, where it is then eliminated through the cloaca. Most individuals have **fat bodies** dispersed throughout their body cavities that store long-term energy in the form of lipids.

Excretory System

Nitrogenous wastes are filtered out of the bloodstream by the **kidneys**. This waste passes through the **ureters** and is stored in the urinary **bladder** prior to being excreted through the cloaca.

Reproductive System

Male frogs have **testes** for the production sperm. Gravid females will have egg-filled **ovaries** and enlarged **oviducts**; in females that are not only smaller oviducts can be observed. The eggs are created in the ovaries and will pass through the oviducts to the cloaca.

Respiratory System

On top of respiring through their skin, tadpoles, being aquatic, respire through their gills that are then replaced by **lungs** as they grow into more terrestrial adults.

Central Nervous System

They have a complex nervous system that is directed by a **brain** which is attached to the anterior portion of their spinal cord. The most anterior parts of the frog's brain are the olfactory bulbs which process sent information. The cerebrum is responsible for all voluntary actions of the body, such as muscle contractions. The optic lobe sits just posterior to the cerebrum and process visual information. The cerebellum works alongside by the cerebrum by coordinating the patterns of movement initiated by the cerebrum. The medulla oblongata carries out and regulates all involuntary functions, such as heart and respiration rates. The spinal cord runs from the medulla oblongata through the vertebral column sending nerve impulses throughout the body.

Circulatory System

Frogs have a closed circulatory system that is important in gas exchange throughout the body. Their **heart** is made up of three chambers. The **right atrium** receives deoxygenated blood from the body and the **left atrium** receives oxygenated blood from the lungs. The third chamber is a large, muscular ventricle that pumps both oxygenated and deoxygenated blood to body, lungs, and skin. The **spleen**, embedded in the mesentery, breaks down old red blood cells and stores excess blood.

Amphibian Internal Anatomy Information Tables: Use the information provided above and in the frog dissection instruction sheet to fill in the table to keep track of important structures, their functions, and applicable body processes and/or systems.

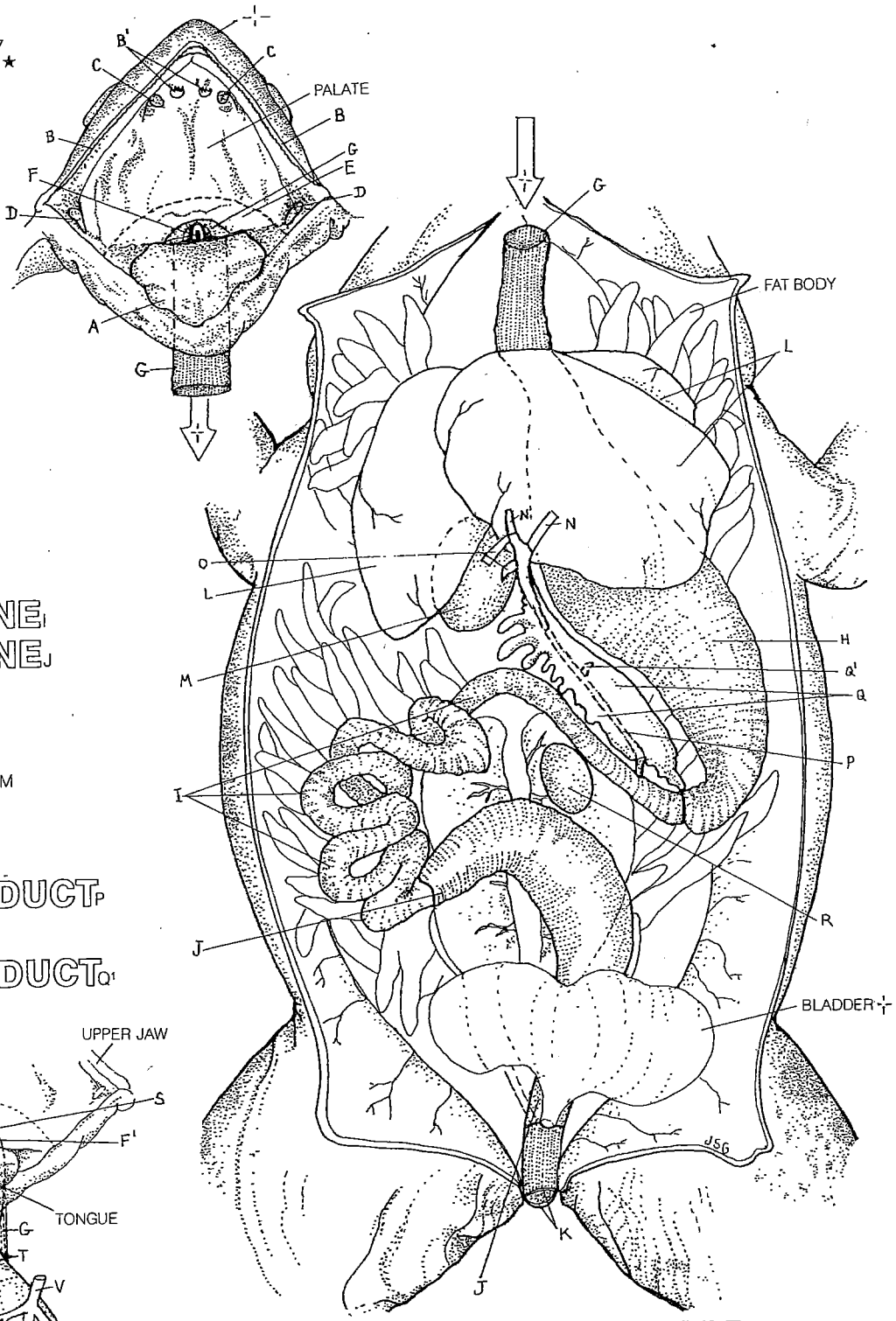
Structure:	Function:	Organ System:
Esophagus		
Stomach		
Pancreas		
Liver		
Gallbladder		
Small Intestine: Duodenum		
Small Intestine: Ilium		
Mesentery		
Large Intestine		
Fat Bodies		
Kidneys		
Ureters		
Bladder		
Testes		
Ovaries		
Oviducts		
Lungs		
Brain		
Heart		
Heart: Right Atrium		
Heart: Left Atrium		
Heart: Ventricle		
Spleen		

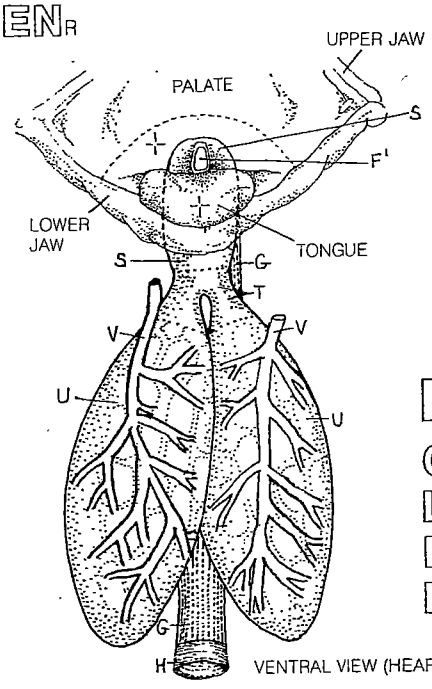
Frog Internal Anatomy Coloring Plates: You are responsible for knowing only the structures/organs bolded in this packet; there may be extra structures/organs in the given color plates.

FROG: VII

DIGESTIVE SYSTEM.

BUCCAL CAVITY★
TONGUE$_A$
MAXILLARY TEETH$_B$
VOMERINE TEETH$_{B'}$
INTERNAL NOSTRIL$_C$
AUDITORY ORIFICE$_D$
PHARYNX$_E$
GLOTTIS$_F$
ESOPHAGUS$_G$
STOMACH$_H$
SMALL INTESTINE$_I$
LARGE INTESTINE$_J$
CLOACA$_K$
LIVER$_L$
GALL BLADDER$_M$
HEPATIC DUCT$_N$
CYSTIC DUCT$_O$
COMMON BILE DUCT$_P$
PANCREAS$_Q$
PANCREATIC DUCT$_{Q'}$
SPLEEN$_R$





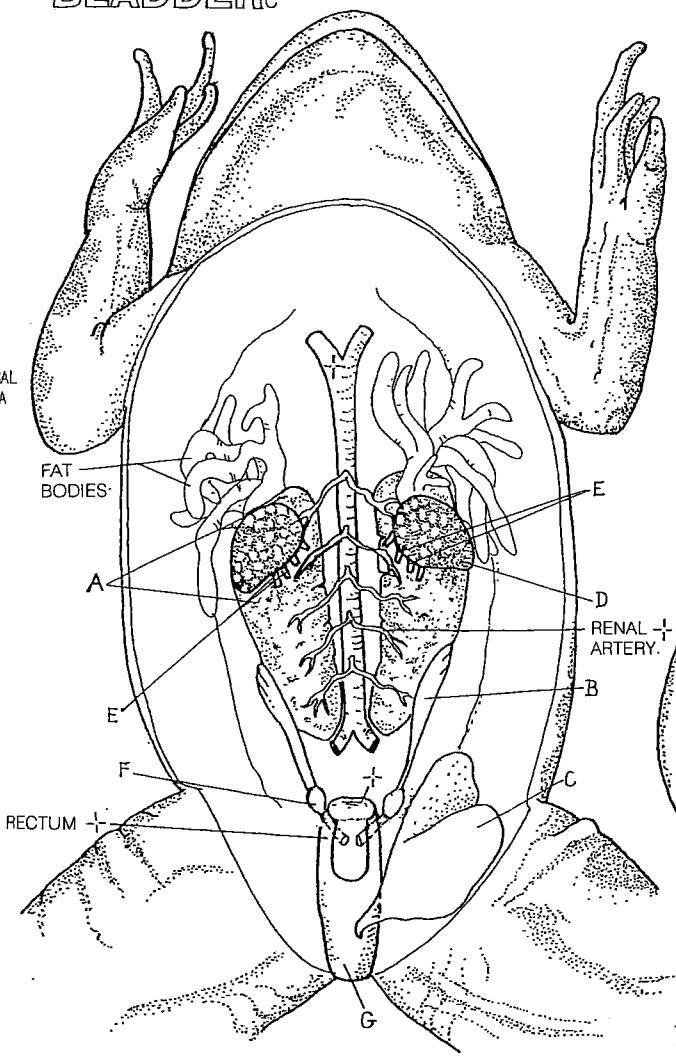
RESPIRATORY SYSTEM.

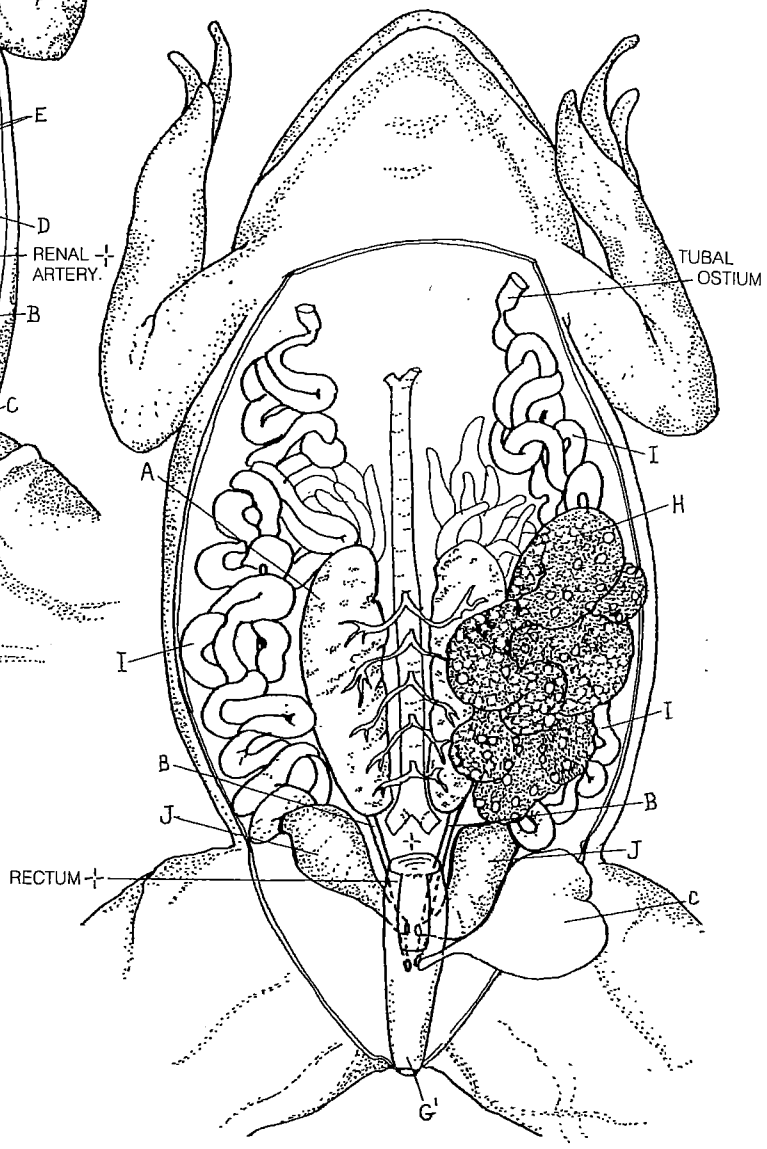
GLOTTIS$_{F'}$
LARYNX$_S$
BRONCHUS$_T$
LUNG$_U$
PULMONARY VESSELS$_V$

FROG: VIII UROGENITAL SYSTEM.

URINARY SYSTEM ★
- KIDNEY A
- ARCHINEPHRIC DUCT B
- BLADDER C

FEMALE REPRODUCTIVE SYSTEM ★
- OVARY/EGGS H
- OVIDUCT I
- UTERUS J
- CLOACA G'





MALE REPRODUCTIVE SYSTEM ★
- TESTIS D
- EFFERENT DUCTS E
- ARCHINEPHRIC DUCT B
- SEMINAL VESICLE F
- CLOACA G

Use pages 782-832 to fill in the tables below about Amphiba; include the major organs/structures needed for each process:

Amphibian Groups/Members	
Basic characteristics	
Feeding	
Respiration	
Circulation	
Response	
Movement	
Reproduction	

Compare/Contrast all of the animal phyla we have talked about in class (Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Mollsuca, Arthropoda, Chordata)

1) What are examples of different species we have learned about in class during this past unit? Be sure to include their phyla._____

2) Phyla of animals with shells or exoskeletons:_____

3) Phyla of soft-bodied animals:_____

4) Phyla of animals that are filter feeders:_____

5) Phyla of animals that respire through their skin:_____

6) Phyla of animals with gills:_____

7) Phyla of animals with open circulatory systems:_____

8) Phyla of animals with closed circulatory systems:_____

9) Phyla of animals with simple nervous systems:_____

10) Phyla of animals with complex nervous systems:_____

11) What are different ways animals move? Be sure to include their phyla._____

12) What are different ways that animals reproduce? Be sure to include their phyla._____

Amphibian Dissection Extension Questions

Use the information from this packet, your chordate textbook worksheet, and your textbook as resources to answer the following questions **ON A SEPARATE PIECE OF PAPER.**

1) Draw and label the life cycle of a frog (pg. 786).

2) Contrast amphibian to reptilian eggs (pg. 786); what modifications in reptilian eggs to allow them to survive on land? (pp. 802-803)

3) Using your textbook, contrast the structure of an amphibian's heart (pg. 785) to that of a mammal's (pg. 824) in terms of number of chambers.

4) How do the number of heart chambers impact the interaction between oxygenated and deoxygenated blood?

5) Use pg. 862 to compare and contrast the brains in evolved in different Chordata classes. How do all of these compare to the ganglia found in the earthworm, grasshopper, and crayfish?

6) In terms of external structures, organs, and organ systems, compare and contrast frogs with the three other animals dissected in class.