# Fetal Pig Dissection

**Lab Overview:** The tissues, organs, and organ systems of a fetal pig are similar in both structure and function to those found in humans. You will observe structures of the skin and muscles, as well as the muscular, digestive, excretory, reproductive, circulatory, and respiratory systems.

**Big Questions:** Try to keep these questions in mind as you do your dissection.

- What organs make up a mammal's body systems?
- How does an organ's location and structure relate to its function?

## Important Navigation Terms

**Ventral** = abdominal side
**Dorsal** = back side
**Anterior** = toward the head
**Posterior** = toward the tail
**Medial** = toward the middle of the body
**Lateral** = toward the outside of the body
**Proximal** = close to a point of reference
**Distal** = farther from a point of reference

## Materials

| | | |
|---|---|---|
| Preserved fetal pig | Forceps | Dissecting pan |
| Probe | Dissecting scissors | Dissecting needles |
| Scalpel | Metric ruler | String |
| Apron | goggles | nonlatex gloves |

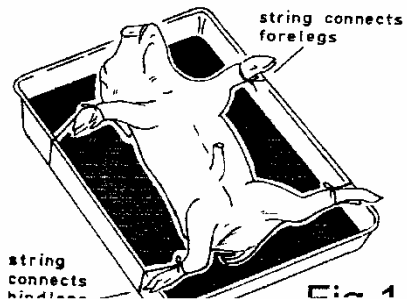
## Hygiene

Put on your apron, goggles and gloves before handling the pig. Be sure to wear them at all times. Do not take off your gloves until after you have completed cleaning up and have checked with your teacher. **Your specimen has been preserved with special chemicals, and sometimes they can be irritating to skin, eyes, and respiratory system** so it is important that at the completion of this lab you wash your dissecting equipment and hands with soap and water.

## Starting Procedure

Carefully cut the top off of the plastic bag your pig was stored in. You will use this bag at the end of the lab to dispose of the pig. Pour the excess preservation fluid into a sink along with running water. Remove the pig from the bag and rinse your pig under gently running cold water before you place your pig in the dissecting pan and return to your lab table.

Position the pig so its ventral side is facing up. To make the dissection easier (did you know that to dissect means to "expose to view"?), use string to hold the legs apart. Tie one end around one front foot, pull the string under the dissecting pan and tie it around the other front foot, pulling tightly to hold the front legs apart. Repeat this procedure with the back legs.



**External Anatomy**

1. Determine the sex of your pig by looking for the urogenital opening. On females, it is located near the anus, and is a tiny, fleshy projection. On males, it is located near the umbilical cord. Males may or may yet have scrotal sacs.

2. Locate the two rows of nipples on the ventral surface. Like humans both male and female pigs have nipples however just like humans only the females lactate.

3. While being careful of any teeth, open the pig's mouth and use your finger to locate the hard palate which will feel like a series of ridges on the roof of the pig's mouth.

4. Now find the soft palate further back on the roof of the mouth. Take a moment to use your tongue to locate your own hard and soft palate. Do not attempt to use your tongue to locate your lab partners (or pig's) hard or soft palate.

5. Examine the teeth of the pig. **Canine** teeth are longer for tearing food, while **incisor** are shorter and used for biting. Notice the taste buds on the side of the tongue.

6. Using the **scissors** cut **both sides** of the mouth from the corner of the jaw towards the opening of the ear as shown in figure #2. Then while one lab partner holds the pig steady another member of the lab team should place their thumb on the pigs tongue while using their opposite thumb on the hard palate. Open the jaw until you can see the deeper portions of the mouth it is ok to hear a cracking sound as the jaw dislocates.

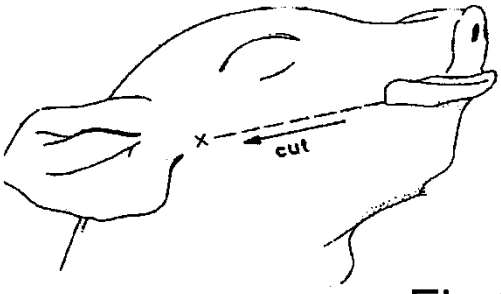


Fig 2

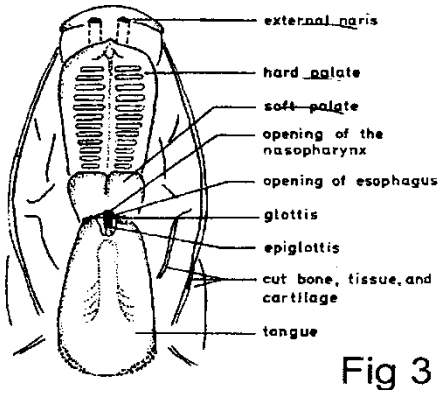


Fig 3

7. Use figure #3 as a guide to help locate the esophagus and epiglottis at the back of the mouth, as well as the pharynx. What are these structures used for?

8. The Normal gestation (the period of time the fetus takes to develop in the uterus) for pigs is about 112 – 115 days. Determine the age of your pig by measuring the length from the tip of the snout to the attachment of the tail. Use the table below to estimate the age of your pig.

| | | |
|---|---|---|
| 11 mm = 21 days | 17 mm = 35 days | 28 mm = 49 days |
| 40 mm = 56 days | 220 mm = 100 days | 300 mm = 115 days |

1. Observe the ears.

2. Look at the eyes. Find the upper and lower eyelids and a small mass of tissue in the upper corner known as the nictitating membrane.

3. Look at the toes of the pig. How many toes (digits) are on each foot?

4. Locate the **umbilical cord**. With scissors, cut across the end of the cord about 2 cm from the body. Examine the 3 openings in the umbilical cord. The largest is the umbilical vein, which carries blood from the placenta to the fetus. The two smaller openings are the umbilical arteries which carry blood from the fetus to the placenta.

5. **Before moving on to the internal anatomy, complete all of the questions for this section on the datasheet and completely label the external fetal pig diagram.**

**Internal Anatomy**

Before starting your cuts look at the diagram to the right. Notice the numbered dotted lines. Use these lines as a guide to properly locate your incisions.

It is important that you make the incisions (cuts) in the order in which they are numbered.

**Be very careful NOT to cut into the organs lying under the muscles.**

Your should begin your first incision by **holding your scalpel like a pencil** and in a steady, even motion use the tip of the blade to make the initial incision through the skin.

**Always try to cut away from yourself.**

After you cut through the skin and muscle, **switch to the scissor.** Scissors will work more efficiently and safely for the rest of the cuts, particularly as your cut the ribs.
Be sure to keep the **point of the scissor up** against the surface of the pig so as to avoid cutting into the organs.

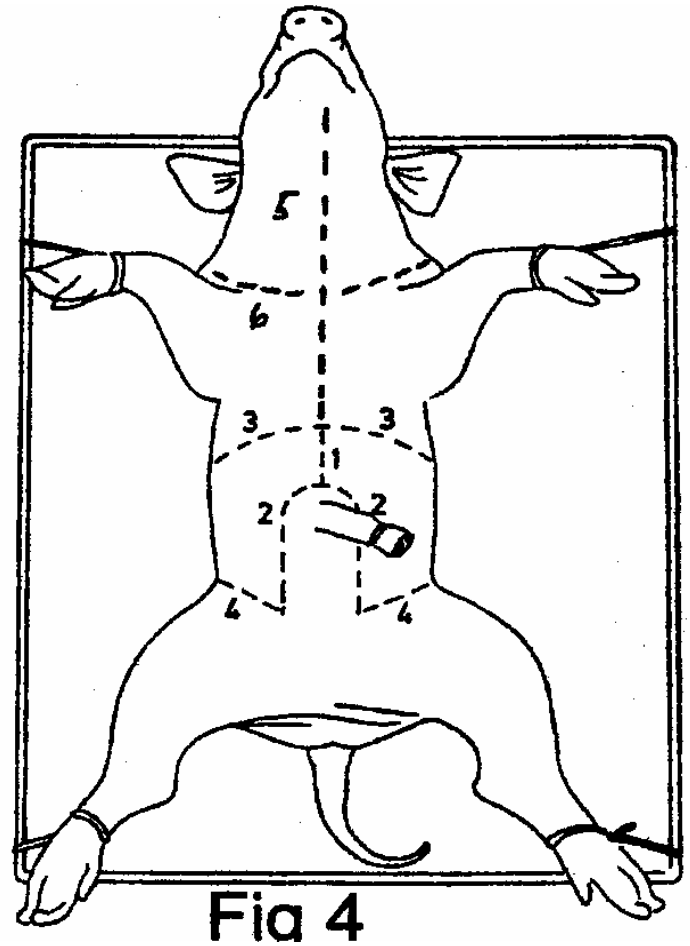


Fig 4

After you complete your incisions spread the flaps of the body wall apart. Cut the umbilical vein, which extends through the liver. Once the vein is cut, carefully pull the flap of skin, including the

end of the umbilical cord between the hind legs. You are now able to see the organs of the abdominal cavity.

There is no blood left in your pig but there will most likely be some preservation fluid within the pig. If you wish to drain it take your pig and pan to the sink and drain the fluid while running the water.

**Begin your identification of organs with the digestive system.**
**Use the diagram below as a guide to the digestive system.**

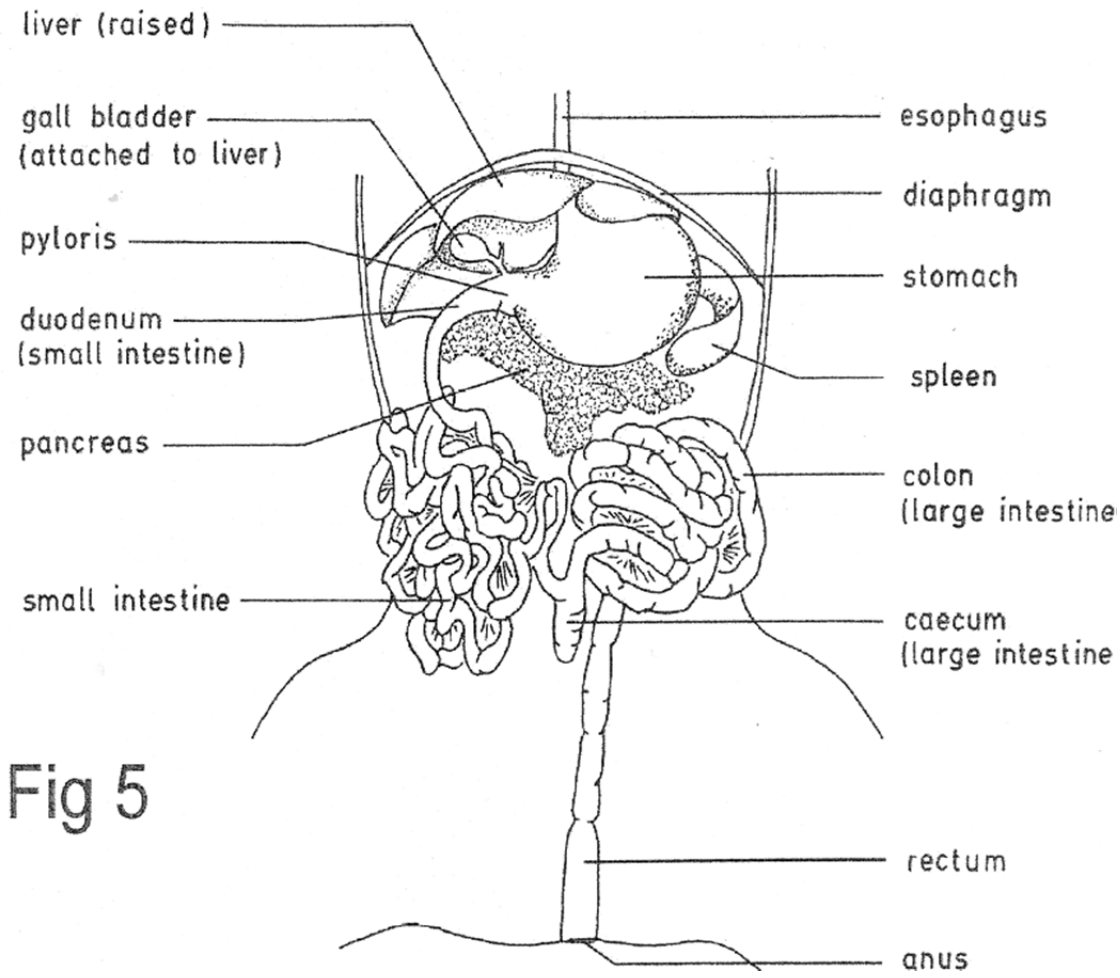



Fig 5

6. Locate the large brownish-red liver. How many lobes (parts) does it have?

7. Locate the pancreas (light-colored and globe-shaped) then turn the liver over and look for the greenish gall bladder. Notice the thin duct that connects the gall bladder to the small intestine.

8. Find the white stomach, which lies beneath and to the right of the liver. Use the scalpel to open the stomach and with your finger feel the interior lining of the stomach. The ridges inside the stomach are called **rugae** and they help increase the area for the release of digestive enzymes.

9. The tongue-shaped organ on top of the stomach is the spleen, which recycles materials from old red blood cells.

10. Locate where the esophagus joins the stomach, and where the small intestine leaves. Sphincters are present in both locations to help control the movement of materials.

11. The first 3-4 cm of the small intestine is the duodenum. Notice that the small intestine is highly coiled and held in place by the mesentery (body membranes).

12. The large intestine appears as a larger less coiled tube. Notice how the large intestine goes to the rectum, and then the anus. Using your fingers remove the intestines from the body and then gently disconnect the intestines and measure the length of each section.

13. With scissors, remove a 3-cm piece of the lower small intestine. Cut it open and rinse it out.

14. Observe the inner surface of the small intestine. Run your finger along it and note its texture. Using a magnifying glass, examine the **villi**, the tiny projections that line the small intestine and increase the surface area for nutrient absorption.

**Use the diagram below as a guide to examine the excretory system.**

15. Locate the dark brown kidneys at the back of the pig's abdomen.

16. Use your fingers to remove one of the kidneys from the body. Place the kidney on the dissecting tray and using the scalpel bisect the kidney horizontally.

17. Locate the area within the kidney where the nephrons would be as well as the collecting duct.

18. Note how the ureters connect the kidneys to the bladder

19. Two large blood vessels, the posterior vena cava and the aorta, lie between the kidneys.

20. Find the urethra

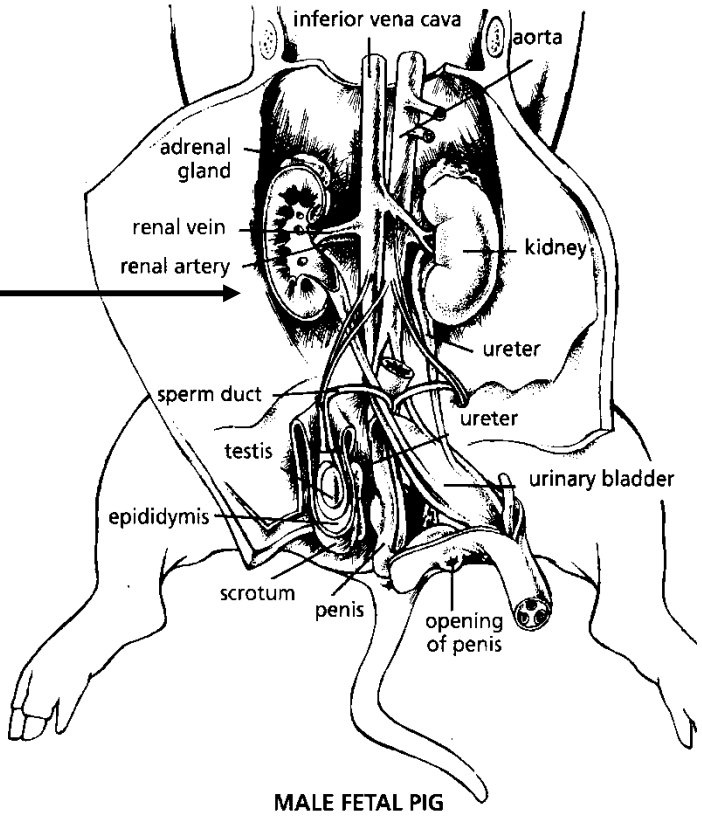
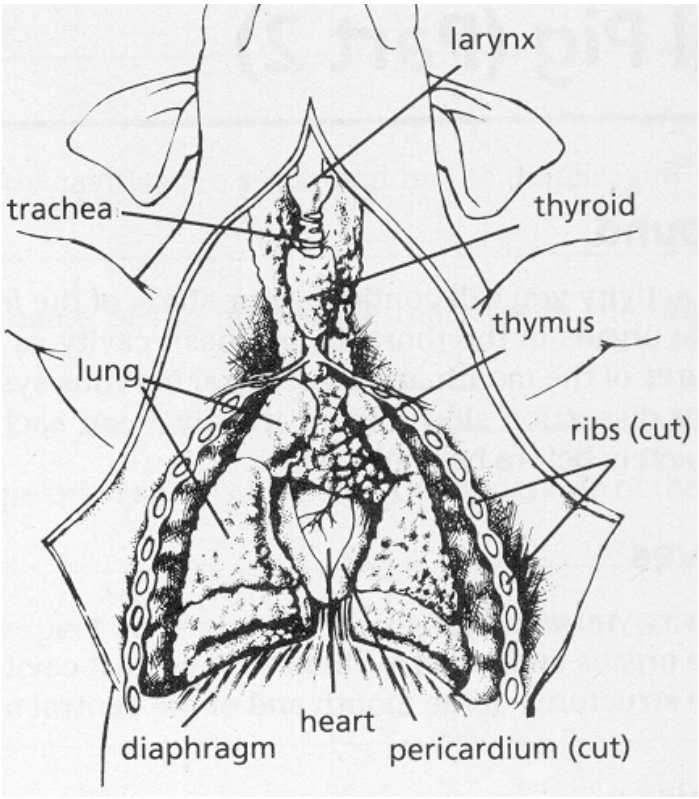



Figure 5

**Circulatory and Respiratory systems**

Use the diagram below as a guide to examine the circulatory and respiratory systems.

21. To fully expose the organs of the thoracic cavity you may have to increase the length of incision #1 and 2. To make it easier to see the upper part of the respiratory system, you will need to extend cut #1 up under the pig's throat and make two more lateral incisions in order to fold back the flaps of skin covering the throat.




22. Examine the diaphragm, use the tip of your finger to feel how smooth this sheet of muscle is as it stretches across the abdominal cavity. The diaphragm isn't used by the fetal pig because gas exchange occurs through the umbilical cord.

23. In the thoracic cavity, carefully separate the pericardium (sac surrounding the heart) and the diaphragm from the body wall.

24. Locate the two, spongy lungs that surround the heart. The tissue that covers and protects the lungs is called pleura. The lungs haven't been used by the fetus so they have never contained air.

25. Find the trachea, a large air tube that lies anterior to the lungs. The trachea is easy to identify because of the cartilaginous rings that help keep it form collapsing as the animal inhales and exhales.

26. Notice that the trachea branches into each lung. These two tubes are called bronchial tubes.

27. Inside the lungs these branch into smaller bronchioles that end with a grape-like cluster of air sacs or alveoli where oxygen and carbon dioxide are exchanged with capillaries.

28. Carefully remove the heart and lungs. Try to keep the arteries and veins intact.

29. Pigs, like all mammals, have four-chambered hearts. The right side of the heart pumps blood to the lungs, while the left side of the heart pumps blood to all other parts of the body. Locate the right and left sides of the heart.

30. Look at the heart and locate the atria and ventricles.. The large vessel on top is the posterior vena cava. The vessel beneath that is the aorta.

31. Find the pulmonary artery which leaves the right ventricle. After birth, this vessel carries blood to the lungs. However, in a fetus, a shunt called the ductus arteriosus allows fetal blood to bypass the lungs and go directly to the aorta, the largest artery of the body.

32. Locate the pulmonary veins that enter the left atrium. After birth, these vessels carry oxygenated blood from the lungs to the heart.

33. Hold the dorsal and ventral surfaces of the heart with your thumb and forefinger and rest the ventricles on your dissecting tray. With a scalpel, cut the heart into dorsal and ventral halves. Caution: The scalpel is very sharp. Use it carefully and always cut away from yourself.

34. Remove any material inside the heart and expose the walls of the atria and the ventricles.

35. Study the internal features of these chambers and note where vessels leave or enter each chamber. Locate the valves between each atrium and ventricle. These structures prevent blood from flowing backward in the heart.

**Answer any remaining internal anatomy questions before starting clean up**

**Clean up:** Please dispose of all remains by wrapping in paper towels and sealing in plastic bags. Wash all utensils and equipment carefully with antibacterial soap. Wash hands carefully with antibacterial soap.

**Post-lab Questions:** Please fill in the tables and answer the questions you will want to have a copy as it makes for a terrific review for your final exam!

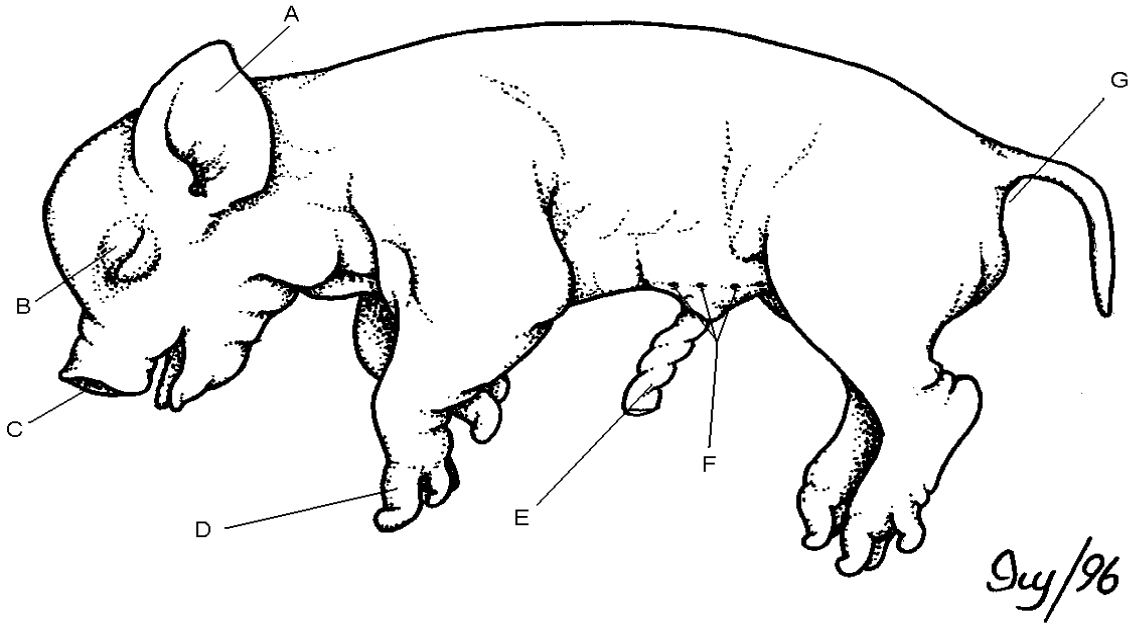
**Name(s) _____ Period_____**

**Fetal Pig Dissection-Data Sheet**

**Part A: External Anatomy**

1. Sex of fetal pig: _____
2. Are pigs omnivores, carnivores or herbivores? _____
3. Fetal pig length in cm:_____
4. Age of fetal pig:_____
5. Number of toes: _____
6. Number of Hooves: _____

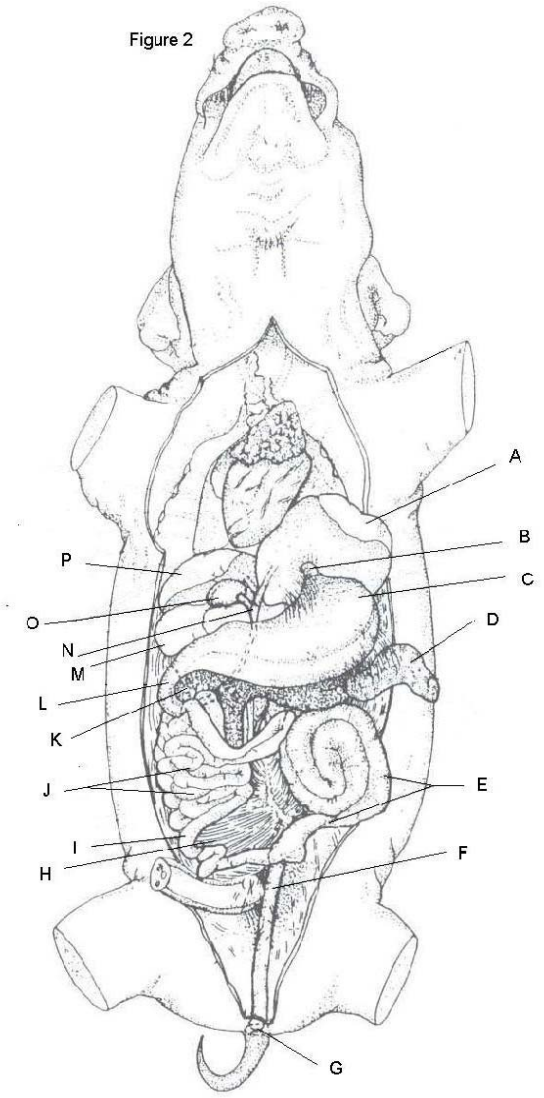
**Label the lettered portions of the fetal pig's external anatomy**




**Part B: Internal Anatomy**

7. Number of lobes in the liver _____
8. Length of small intestines: _____cm
9. Length of large intestines: _____cm
10. What is the function of the small intestine?

## Fetal Pig Digestive System




A. _____

B. _____Esophagus _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____Mesentery _____

I. _____

J. _____

K. _____Bile Duct_____

L. _____

M. _____Liver_____

N. _____Bile Duct_____

O. _____

P. _____Liver_____

## Fetal Pig Excretory System

11. Number of kidneys _____

12. What role did the pig's umbilical cord serve?

## Fetal Pig Respiratory System

13. What protects the lungs?

14. What is the function on the diaphragm in a living pig?

| Digestive System Organ | Function |
|---|---|
| Stomach | |
| Liver | |
| Pancreas | |
| Small intestine | |
| Large intestine | |
| Gall bladder | |
| Esophagus | |
| Salivary glands | |
| Epiglottis | |

| Excretory System Organ | Function |
|---|---|
| Kidney | |
| Nephron | |
| Ureter | |
| Urethra | |

| Organs of the Circulatory and Respiratory Systems | Function |
|---|---|
| Artery | |
| Vein | |
| Larynx | |
| Epiglottis | |
| Alveoli | |
| Capillaries | |
| Left side of heart | |