Name of Partner Completing Packet \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Partner Researching Information \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Partner Dissecting Rat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name of Rat \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lab: Rat Dissection**

**Friendly Reminder before we begin: Getting to participate in this lab is a privilege and not a right**. The tools that we are using in this lab can be dangerous if not used the way they are intended. Additionally, the rats are to be used for scientific purposes only, any misuse (playing around) with the rats is considered disrespectful and will result in automatic exclusion from the lab.

\* Each question/sketch is worth 2 points. Each signature is worth 9 points. All partners are responsible for ensuring that all parts of this lab are completed. In addition, all partners need to take pictures of the completed lab for study purposes.

**PROCEDURE**

**A) Rat External Anatomy**

1. Obtain your rat. The rat will be damp from the preservative chemicals. Rinse it off with water and place it in your dissecting pan to observe the general characteristics.
2. *What do the following terms mean?*

*Dorsal: Ventral:*

*Anterior: Posterior:*

1. Note the hairy coat that covers the rat and the sensory hairs (whiskers) located on the rat's face, called **vibrissae**.

*Draw a picture to show where the vibrissae are located.*

1. The mouth has a large cleft in the upper lip, which exposes large front **incisors** (two middle teeth).

*Because rats are gnawing animals, their teeth have a special adaptation. What is it?*

1. Note the eyes with the large **pupil** and the **nictitating membrane** found at the inside corner of the eye. *What is the purpose of the nictitating membrane?*
2. The ears are composed of the external part, called the **pinna**, and the ear canal.

*What is the purpose of the pinna?*

1. Examine the **tail**, the tails of rats do not have hair, though some rodents, like gerbils, have hair on their tails.
2. Locate the **anus**, which is ventral to the base of the tail.
3. On female rats, just posterior to the last pair of teats, you will find two openings- 1) the urinary opening and behind that 2) the vaginal orifice, which is in a small depression called the vulva.
4. On males, you will find a large pair of scrotal sacs, which contain **testes**. Just anterior to the scrotal sacs is the prepuce, which is a bulge of skin surrounding the penis. The end of the penis has a urogenital orifice, where both urine and sperm exit.

*What is the sex of your rat?*

1. Locate the **teats** on the ventral surface of the rat. Check a rat of another sex.

*Do both sexes have teats?*

**B) Opening and Pinning Rat**

Dissecting Tools will be used to open the body cavity of the rat and observe the structures. Dissecting does not mean "to cut up"; in fact, it means "to expose to view". Careful dissecting techniques will be needed to observe all the structures and their connections to other structures. Always raise structures to be cut with your forceps before cutting, so that you can see exactly what is underneath and where the incision should be made. Never cut more than is absolutely necessary to expose a part. Do not completely cut out/remove organs or tissues from the rat.

*What does “dissecting” mean?*

1. Obtain a set of dissecting tools and place the rat ventral side up.

2. Using scissors, make the incisions in the rat, following the guided numbers. Lift the abdominal skin with forceps and cut through it with scissors. Make sure to not cut too deeply and keep the point of the scissors facing upward. Carefully cut through the muscles of the abdominal wall and through the rib cage, avoiding the underlying organs. Once the body cavity is opened, you may pin the flaps to the dissecting tray.



Before you go any further, show your teacher and have them initial your lab worksheet.

**Teacher’s Initials \_\_\_\_\_\_\_\_\_\_\_\_\_**

**C) Thoracic Cavity Investigation** Refer to the diagram below if you need help identifying the organs.



\_\_\_\_ 1. Locate the **diaphragm**. This is the thin layer of muscle that separates the thoracic from the abdominal cavity. *What is the function of the diaphragm?*

*Which system does the diaphragm belong to?*

\_\_\_\_ 2. Locate the **thymus gland**. This is located directly above the heart. It is much larger in young rats than in older rats. *What is the function of the thymus gland?*

\_\_\_\_ 3. Gently push the thymus to the side to view the **heart**. This is located in the center of the cavity. As mammals, rats have four chambers: 2 atria and 2 ventricles.

*Sketch the interior of a heart (human or rat) below and label atria and ventricles.*

*The walls of the ventricles are much thicker than those of the atria. Why is this?*

\_\_\_\_ 4. The **aortic arch** is a large blood vessel located at the top of the heart. Its job is to carry oxygenated blood from the heart to the body.

*Is the aorta an artery or a vein?*

\_\_\_\_ 5. Examine the throat region to identify the **trachea**. The trachea is a hard ridged structure descending from the pharynx. The trachea will branch off in two tubes called **bronchi**, and then lead to the large soft tissue of the left and right **lungs**.

*Why is the trachea covered in cartilage rings?*

*Sketch these structures below.*

\_\_\_\_\_ 6. Push the trachea to one side to expose the **esophagus**. Follow the esophagus through the diaphragm to its junction with the stomach.

*Which system does the esophagus belong to?*

Before you go any further, show your teacher these organs and have them initial that you have completed this section.

**Teacher’s initials \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**D) Abdominal Cavity and Organ Investigation** Refer to the diagram if you need help identifying the organs.



\_\_\_\_ 1. Look in the abdominal cavity. The abdominal organs may still be covered with a membrane, the peritoneum, but this usually comes off with the overlying layers.

\_\_\_\_ 2. Locate the **liver**. The liver is the large dark purple/brown structure just underneath the diaphragm used for producing bile as well as storing glycogen and detoxifying the blood. You will not see a gall bladder in the rat as they do not have them!

\_\_\_\_ 3. Locate the **stomach**. The stomach is located underneath the diaphragm in the left side of the abdominal cavity. The functions of the stomach include food storage, physical breakdown of food and the digestion of protein. The opening between the esophagus and the stomach is called the cardiac sphincter. *Gently open the stomach and describe what you see.*

\_\_\_\_ 4. Locate the **spleen**. This a small dark purple/brown structure attached to the stomach. The spleen functions in the destruction of blood cells as well as blood storage.

*Which system does the spleen belong to?*

\_\_\_\_ 5. Locate the **pancreas**. The pancreas is located in the tissue between the stomach and small intestine. It is brownish and flat. Look for a thin, membranous structure with the consistency of cottage cheese.

*What is the function of the pancreas?*

\_\_\_\_ 6. Locate the **small intestine**. The small intestine is thin and coiled as well as descends from the stomach. It continues the chemical digestion of food with enzymes from the pancreas as well as its own enzymes. It them absorbs the digested nutrients into the blood stream for transportation around the body.

*Which two body systems are interacting in the small intestine as described above?*

\_\_\_\_ 7. Locate the **large intestine/colon**. This is the large greenish tube that extends from the small intestine to the anus.

*What is absorbed from the fecal matter while it is in the large intestine?*

\_\_\_\_ 8. Locate the **cecum**. This is the large sac most often confused with the large intestine. It is actually the point at which the small intestine becomes the large intestine. Food is temporarily stored in the cecum while helpful bacteria digest the cellulose found in plant cells. Most herbivores have a large cecum. In humans and other omnivores, the cecum is smaller and referred to as the appendix.

\_\_\_\_ 9. The **mesentery** is a membrane that surrounds and supports most of the digestive system. Lift the small intestine with the forceps to view the mesentery. Use your scissors to cut the mesentery of the small and large intestines, but do not detach them from the stomach or rectum.

*Compare the lengths and diameters of the large and small intestines. Which is longer?*

*Which is thicker in diameter?*

*List the organs food passes through starting with the mouth and ending with the anus.*

Before you go any further, show your teacher these organs and have them initial that you have completed this section.

**Teacher’s initials \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**E) Urogenital System Investigation**. Refer to the diagrams below if you need help identifying the organs. You will need to exchange rats with another group in order to view both a female and a male rat.

  **MALE FEMALE**



\_\_\_\_1. To located the **kidneys**, move the stomach and the intestines to one side with the probe. The kidneys are bean-shaped structures located toward the back of the abdominal cavity on either side of the spine.

*What is the function of kidneys?*

*How many kidneys are there?*

\_\_\_\_2. Cut one of the kidneys lengthwise to view the inside.

*Sketch the inside of the kidney here.*

\_\_\_\_ 3. Follow the course of one of the ureters, which carry urine from the kidney to the **urinary bladder**.

*What is the function of the bladder?*

**Male Rat**

\_\_\_\_4. The major reproductive organs of the male rat are the **testes** (singular: testis) which are located in the scrotal sac. Cut through the sac carefully to reveal the testis. On the surface of the testis is a coiled tube called the **epididymus**, which collects and stores sperm cells.

**Female Rat**

\_\_\_\_5. The short gray tube lying dorsal to the urinary bladder is the vagina. The vagina divides into two **uterine horns** that extend toward the kidneys. This is referred to as a duplex uterus.

*Why do female rats have a duplex uterus?*

Before you go any further, show your teacher these organs and have them initial that you have completed this section.

**Teacher’s initials \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**E) Clean up**

**Cleanup Day 1:**

1. Place your rat in the plastic bag, seal and label with your rat’s name. Place your rat in the lab where your teacher tells you to.

2. Rinse trays and tools and leave them to dry in the lab sinks.

3. Wipe down lab table.

**Teacher’s Initials: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Cleanup Day 2:**

1. Place your rat in the plastic bag you used yesterday. Give this to your teacher.

2. Rinse and trays and tools and leave them to dry in the lab sinks.

3. Wipe down lab table.

**Teacher’s Initials: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**You will have a lab practical over the information in this lab. You should be able to identify each of the organs in bold print as well as give the function and body system associated with it.**

**Each group member needs to take a picture of the completed packet to study with. The blank packet can also be found on schoolweb if needed.**