

## Rat Dissection Lesson Plan

Author: Chelsey Geiger

Topic or Unit of Study: Human Anatomy  
(Digestive and Respiratory Systems)

Grade/Level: 6<sup>th</sup> Grade

Lesson Start and End Time: 1.5 hours

### Outcomes

Standards: PDE Academic Standards for Health, Safety and Physical Education  
Concepts of Health

10.1.3

Identify and know the location and function of the major body organs and systems:  
circulatory, respiratory, muscular, skeletal and digestive.

10.1.6

Identify and describe the structure and function of the major body systems: nervous, muscular,  
integumentary, urinary, endocrine, reproductive, and immune.

Objective: SWBAT analyze the locations and lengths of the organs of the human digestive and  
respiratory systems by examining the same structures in a rat dissection and labeling the  
digestive and respiratory organs in diagrams of the rat.

### Instructional Materials:

Carolina Biological Supply Company Rat Dissection BioKit: 8 white rats, goggles, gloves and  
aprons.

Carolina Biological Supply Company. *Rats! Inquiry-Based Dissection with Carolina's Perfect  
Solution Specimens*. Retrieved from  
[http://www.marric.us/files/HS\\_6\\_Dissection\\_Carolina\\_rat\\_dissection.pdf](http://www.marric.us/files/HS_6_Dissection_Carolina_rat_dissection.pdf)

[Photograph of Rat Dissection used for handout]. Retrieved from  
[http://science.jburroughs.org/mbahe/BioA/RatePhotos%20Web/content/046Rat\\_large.html](http://science.jburroughs.org/mbahe/BioA/RatePhotos%20Web/content/046Rat_large.html).

Teacher -

- Rat Diagram and Measurements Worksheets: one per group
- Powerpoint of Introduction and Procedure
- Writing utensils for students
- Calculators

Student (in groups of 3) –

- ∄ Rat model
- ∄ Dissecting pan
- ∄ Dissecting scissors and tweezers
- ∄ Personal protective equipment: gloves, goggles, lab coat
- ∄ Rat Diagram and Measurements Worksheet
- ∄ Writing utensils
- ∄ Calculator

## Procedures with Time Span

### Introduction (20 minutes):

The students will be broken up into groups of three.

Each student in the group will have a job:

1. **Dissector:** this student will be the primary person dissecting the rat; others can take turns if they wish.
2. **Measurer:** this student will measure the length of the GI tract and generate a ratio of that length to the length of the rat from nose to tail.
3. **Labeler:** this student will be the one writing the labels on the diagram they will be completing as a group.

All students are responsible for discussing the organs and their locations in the rat altogether as they dissect and coming to a consensus on what to put in each blank space on the diagram.

The rat dissection lab will begin with a safety demonstration with the following rules:

- NO running
- NO eating
- Stay in your groups
- Be careful with sharp objects
- Ask for help if needed
- Wear protective equipment at all times:
  - Goggles
  - Gloves
  - Lab coats

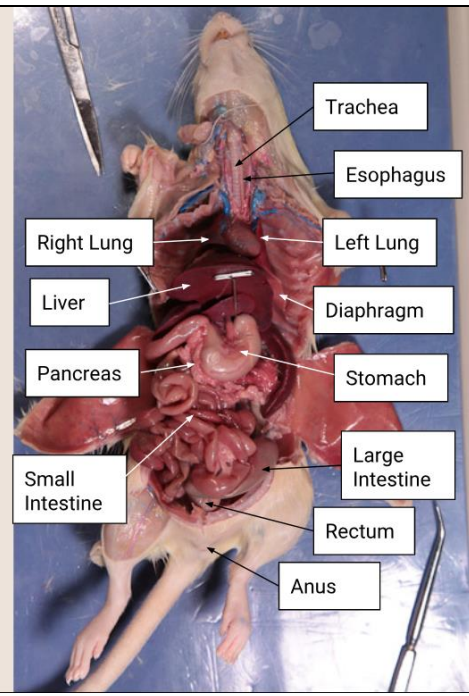
The students will put on their lab coats.

The teacher will have a Powerpoint Presentation that begins with the following discussion questions (1 per slide):

- Why do you think we looking at the rat to study the human body?
- How is a rat similar to a human?
- How is a rat different from a human?
- What do you think rats eat? And how does it relate to what humans eat?

The students will be shown the following slide of what the rat should look like when they cut it open. This diagram will have all the parts labeled that they should be looking for. They will be given diagrams to label as a group as they perform their dissections (see below).

This is what you should see once you cut your rat open.



#### Developmental Activities (45 minutes):

**Activities** - The students will put on their goggles and gloves. The students will be performing dissections on rat models in their groups. Each group will be given a worksheet.

Each student in the group will have a job:

1. **Dissector:** this student will be the primary person dissecting the rat; others can take turns if they wish.
2. **Measurer:** this student will measure the length of the GI tract and generate a ratio of that length to the length of the rat from nose to tail.
3. **Labeler:** this student will be the one writing the labels on the diagram they will be completing as a group.

All students are responsible for discussing the organs and their locations in the rat altogether as they dissect and coming to a consensus on what to put in each blank space on the diagram.

The procedure will be as follows:

#### *Part 1: External Anatomy*

The students will be asked the following questions (in powerpoint):

1. What are some features that stand out to you?
2. Does it look anything like a human on the outside?
3. Pick up the rat. How does it feel?
4. What position is it in?

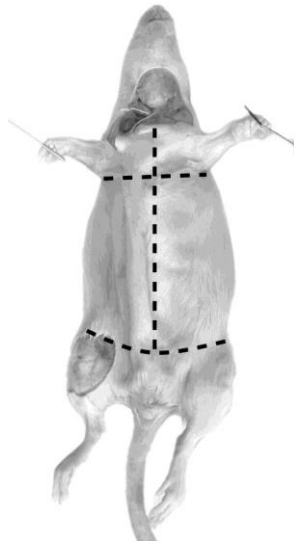
#### *Part 2: Beginning the Dissection*

**Please note:** There will be faculty and college students that will all be walking around and assisting the students.

1. Beginning at the lower abdomen, the **Dissectors** will use scissors to cut only the rat's skin and muscles up to the neck area, being careful not to cut deep to organs below. The **Dissectors** will then make cuts across the top of the thoracic cavity (behind

forelimbs) and the bottom of the abdominal cavity (before hindlimbs). See diagram below.

- a. The **Measurers** will assist the Dissectors as needed.



### *Part 3: Respiratory System*

1. The **Dissectors** will have to cut the ribcage of the rat out in order to expose the thoracic cavity. Using scissors, the students will cut along the sternum and cutting them on each side from the sternum to get them out of the way.
  - a. The **Measurers** will assist the Dissectors as needed.
2. The **Dissectors** will then cut the peritoneum surrounding the trachea in order to get a good view of it.
  - a. The **Measurers** will assist the Dissectors as needed.
  - b. The **Labelers** will start discussing the parts they are supposed to be identifying: *trachea, left lung, right lung, diaphragm*.
  - c. The group as a whole will decide on which organ is which, and the **Labeler** will mark it on the diagram.

### *Part 4: Digestive System*

1. Faculty members will demonstrate how to extract the digestive system from the abdominal cavity, which is essentially as follows.
2. The **Dissectors** will then cut the mesentery (or peritoneum) that attaches the digestive tract to the posterior wall of the abdominal cavity. They will do so in such a manner that all of the organs remain attached to one another.



3. The **Measurers** will lay out the digestive tract along the lab table on a paper towel.
  - a. The **Measurers** will also measure the following:
    - i. The length of the rat from nose to tail
    - ii. The length of the rat's small intestine
    - iii. The length of the rat's large intestine
    - iv. The length of the rat's entire digestive tract
4. The students will observe the organs in the path that food travels through the digestive system.
  - a. The **Labelers** will start discussing the parts they are supposed to be identifying: *esophagus, pancreas, stomach, small intestine, cecum, large intestine, rectum, anus*.
  - b. The group as a whole will decide on which organ is which, and the **Labeler** will mark it on the diagram.

The Measurer from each group will write their measurements on the board for the entire class to copy down onto their worksheet and discuss in the closure.

**Assessment** - The students will complete a worksheet with photograph of a dissected rat with blanks to fill in for each organ, given a word bank (see below in the Assessment section). They will fill in the blanks as they examine the rats they are dissecting. Below is a copy of the worksheet. The intention was to make the diagrams as realistic as possible so that the students are able to label the diagrams as accurately as possible from their observations during the rat dissections. One student per group will be responsible for writing in the group's responses, but all are required to discuss their ideas and come to a consensus on each organ they label.

#### Closure/Summary (25 minutes):

The lesson will conclude with the students cleaning up their areas using the following procedure:

- All waste, including gloves, in the proper trash container.
- Cleaning dissecting pans, if necessary.
- Returning safety goggles and aprons

Once all groups have written their measurements on the board, each group will copy down all of the measurements.

Each group will then calculate the class average of each length measured. They will then calculate the ratio of the Average Length of the Digestive Tract to the Average Body Length of the Rat.

There is a slide in the PowerPoint Presentation that lists the measurements of the human body height and digestive tract length for comparison to that of the rat. The teacher will do this calculation and discuss with the class how it compares to the ratios they calculated for the rat.

The teacher will pose the following questions to the students on the last slides of the presentation:

- How did the rat's respiratory system look like a human's?
- How did it look different?
- How did the rat's digestive system look like a human's?
- How did it look different?

Assessment: The students will complete a worksheet with photograph of a dissected rat with blanks to fill in for each organ, given a word bank. They will fill in the blanks as they examine the rats they are dissecting. Below is a copy of the worksheet. The intention was to make the diagrams as realistic as possible so that the students are able to label the diagrams as accurately as possible from their observations during the rat dissections. One student per group will be responsible for writing in the group's responses, but all are required to discuss their ideas and come to a consensus on each organ they label.

Rating Scale: This score will be for all three students in the group.

**3 – Exemplary:** Diagram labeling is complete and accurate; all measurements are filled in and calculations are complete.

**2 – Proficient:** Diagram labeling is mostly accurate; all measurements are filled in and calculations are complete.

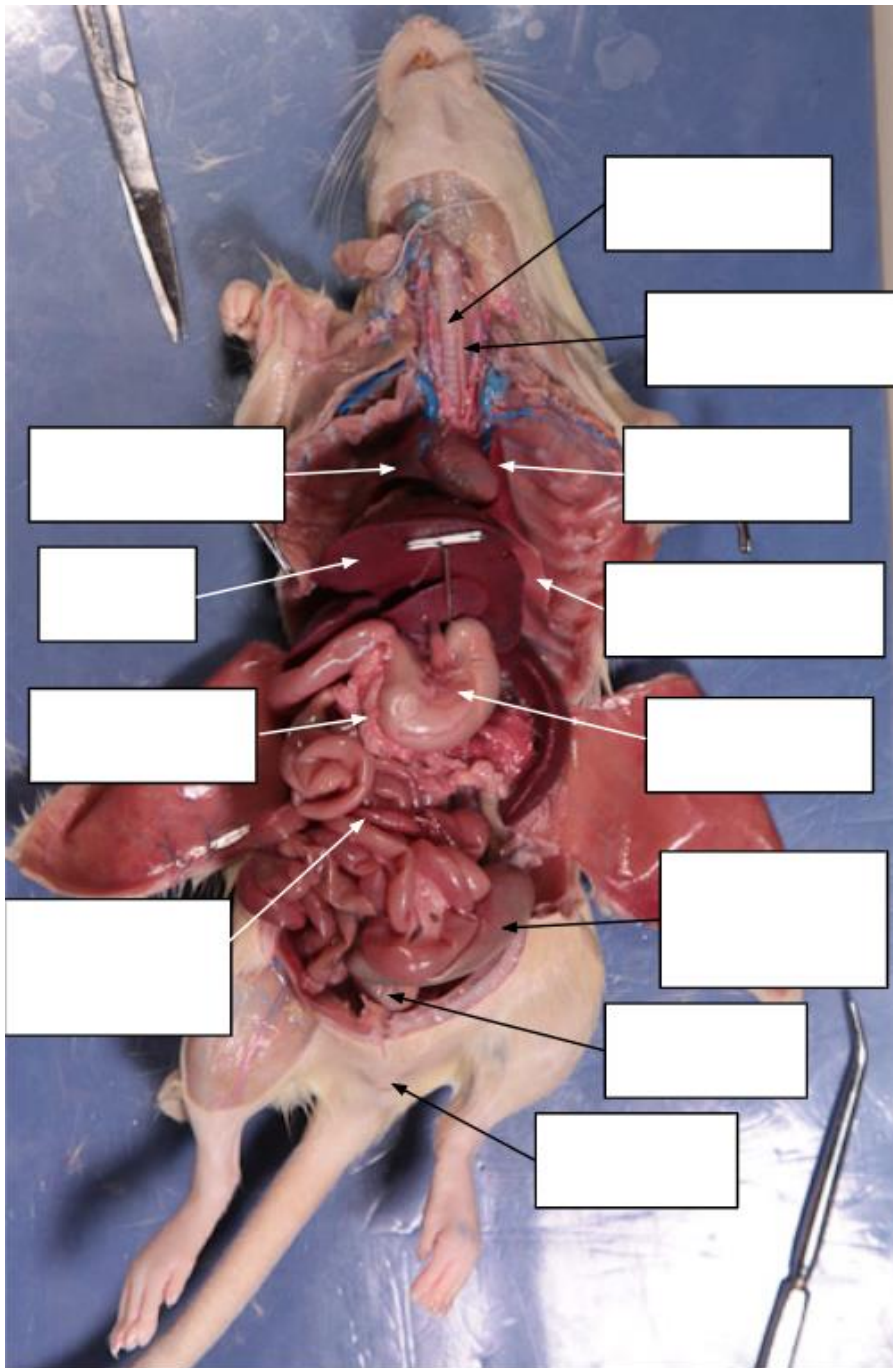
**0/1 – Unacceptable:** Diagram is not accurately labeled, measurements and calculations are not complete and/or worksheet was not submitted.

Names: \_\_\_\_\_

## Rat Dissection

Directions: As you dissect the rat as a group of three, label the organs that you see using these words: **trachea, esophagus, stomach, left lung, right lung, small intestine, large intestine, rectum, anus, liver, pancreas, diaphragm.**

1. Please note: You will not necessarily be able to see the pharynx, larynx, bronchi, bronchioles or alveoli. Also, rats do not have a gallbladder.



Students' Names:

## Measurements

**Instructions:** Copy down each group's measurements, take the average of each column, and determine the ratio of a rat's digestive tract length to its body length.

Length of Rat (Nose to Tail)	Length of Small Intestine	Length of Large Intestine	Length of Entire Digestive Tract
Total:	Total:	Total:	Total:

Average Length of Rat Body	Average Length of Small Intestine	Average Length of Large Intestine	Average Length of Digestive Tract

Average Human Height:

- Male: 5.6 ft (171cm)
- Female: 5.2 ft (159 cm)

Average Length of Human Digestive System: 30 ft (900 cm)

Ratio of Human Digestive Tract to Height:

Ratio of Digestive Tract Length =  Average Length of Digestive Tract ÷ Average Length of Rat Body	
--	--