

Wonderful Worms!



OBJECTIVES:

Students will:

1. observe a worm, identify and describe different parts of a worm's anatomy.



STANDARDS: Science



SKILLS: Analysis, classification, description, problem solving



SETTING: Classroom



TIME: 60 minutes



VOCABULARY:

Blood
Crop
Digestion
Esophagus
Gizzard
Heart
Intestine
Pharynx

Introduction

Overview:

In this lesson, students will learn about worms by observing live red worms in groups and answering questions about worms based on their observations.

Teacher Background:

Worms are incredible decomposers. The worms used for composting are surface feeders called “Eisenia fetida” pronounced (eye-SEN-ee-uh FE-ti-duh). They are also called “manure worms,” “red wigglers,” or “red worms.” More than 7,000 species of worms inhabit the world, and they have always been important to ecosystems.

There are a lot of interesting facts to know about a worm's biology. Their body is designed primarily for digestion and reproduction. They prefer dark, damp environments underground, they breathe through their skin, and their bodies are made up of 90 percent water.

A worm tunnels through the soil by using a complex system of muscles that move its body segments. Each segment has bristles, called “setae,” which are attached to the skin and help with movement. Worms do not have eyes or teeth. They use gritty soil particles, held in their gizzard, to grind the food they take in through a muscular mouth opening.

Worms have five hearts and iron-rich hemoglobin-based blood. They are hermaphroditic, so each worm has both male and female sexual organs. Worms drop a cocoon and have offspring; each cocoon may produce two to four worms. Eight adult red worms can produce 1,500 offspring within six months, if conditions are favorable.

Materials:

Students:

- “Warming Up to Worms” worksheet (one per student)
- “Worms Inside and Out” handout (one per student)
- Magnifying boxes or glasses (one per group)
- Worms (one to two per group)
- Damp paper towel (one per group)

Teacher:

- “Worm Anatomy” overhead
- Rubric overhead
- Rubrics (one per student)

Preparation:

Be prepared to organize students into groups of four and assign group roles.

Purchase red worms at a gardening store or fish and tackle store; or contact www.StopWaste.Org, or call 1-877-786-7927 for more sources.



ACTIVITY

Discussion

1. Using a KWL chart, ask students to brainstorm questions they have about red worms and record what students “Know and Want to Know” about red worms.
2. Discuss how red worms are recyclers (because they eat organic waste like food scraps and turn it into valuable compost).
3. Tell the students that they are going to investigate the answers to their questions about red worms by observing red worms.
4. Show an overhead of the lesson rubric, and review the expectations for this lesson.

Procedure

1. Organize the students into groups of four or more.
2. Distribute the “Warming up to Worms” worksheet to each group member.
3. Explain and discuss the anatomy of worms by using the overhead of “Worm Anatomy.”
4. Explain that all group members will participate in completing their worksheet by using their handout to help answer the questions.
5. Assign one student in each group to serve as the materials manager with the responsibility of getting and returning materials. Assign a second student in each group to serve as the reporter who will later describe the group’s findings to the class. A third student will specialize in using the page “Worms Inside and Out” to help others. A fourth student is assigned the role of recorder.
6. Discuss the appropriate way to handle worms. For example, students should wash their hands before and after handling the worms, treat them with respect, be careful, etc. Write the class rules for handling on the board.
7. Ask the materials manager from each group to collect a worm on a damp paper towel and a magnifying lens.
8. Ask the groups to observe their worm using a magnifying lens and draw or sketch their worm on the worksheet.
9. Distribute “Worms Inside and Out” handout to each student.
10. Ask the group to complete the remaining questions on their worksheet.

Wrap-Up

1. Ask the reporters from each group to share one or two answers from their worksheets. If there are any questions that remain unanswered from the KWL chart, brainstorm ways to research the answers to those questions.
2. Once you have completed reviewing their answers, use the KWL chart to address what the student learned about red worms.
3. Ask the students to explain the importance of worms as decomposers.

Final Assessment Idea

Have students create a three-dimensional model of a red worm by reusing materials to show different parts of a worm’s anatomy.



RESOURCES

Extensions:

Have students review the KWL chart and identify questions they have about worm behavior. Next, ask them to set up an experiment to test one of their questions about worm behavior using the scientific method.

Teacher Materials:

California State Content Standards

The standards below represent broad academic concepts. This lesson provides connections to these academic concepts through hands-on activities and exploration. This lesson is not designed for a student to master the concepts presented in the standards. Additional lessons in the classroom that build on this lesson or the standard(s) ensure that students will have the opportunity to master these concepts.

SCIENCE	CONTENT STANDARDS
Grade 4	Life Science 3.b. Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well and some cannot survive at all.
Grade 5	Life Science 2.a. Students know many multicellular organisms have specialized structures to support the transport of materials. 2.b. Students know how blood circulates through the heart chambers, lungs and body and how carbon dioxide (CO ₂) and oxygen (O ₂) are exchanged in the lungs and tissues. 2.c. Students know the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine and colon in the function of the digestive system. 2.d. Students know the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder. 2.g. Students know plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO ₂) and water (respiration).





Teacher

Wonderful Worms! Rubric

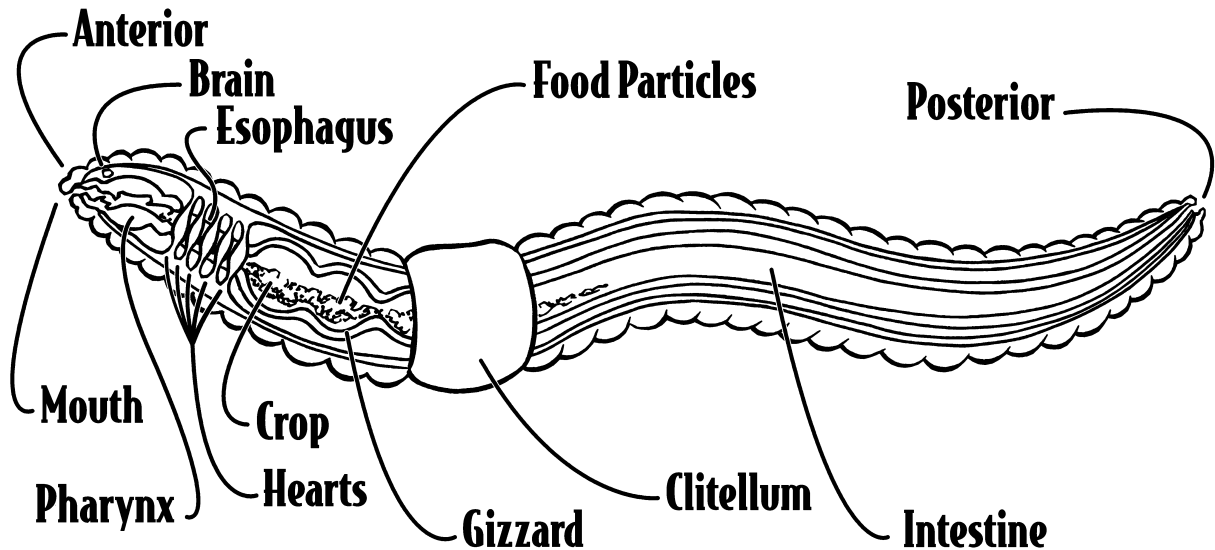
A rubric is a scoring tool that defines the criteria by which a student's work will be evaluated. This rubric is provided to assist you in setting expectations for students and assessing their performance and engagement during the lesson based on specific tasks. Ideally, a rubric is developed with the cooperation of the students. Two blank rows have been provided for you and your class to develop and add your own assessment criteria.

CATEGORY	4	3	2	1
Identifies and describes different parts of a worm's anatomy	Student correctly identifies and describes all parts of a worm's anatomy.	Student correctly identifies and describes some parts of a worm's anatomy.	Student identifies and describes a few parts of a worm's anatomy.	Student does not complete the assignment.
Executing group role	Student does well executing their group role.	Student has difficulty in executing their group role.	Student does little to execute their group role.	Student does not attempt to execute their group role.





Worm Anatomy



Anterior: The head is located at the anterior end of the worm's body. The anterior end is closer to the clitellum and usually more pointed than the posterior end. Red worms have no eyes and cannot see. They use light-sensitive skin cells at the anterior end of their body to sense light and move away from it.

Brain: Red worms have simple brains that help direct body movement when exposed to light.

Clitellum: Adult red worms have a distinct swelling called a "clitellum" located closer to the anterior end of the body. Each worm has a set of both male and female sexual organs. Two worms must join up to mix the sperm and egg. During this process, the clitellum releases a sticky secretion that holds the sperm and egg together. This secretion will eventually harden. As the worm wriggles backwards out of the hardened shell, the egg and sperm are deposited, and the secretion seals together to form a cocoon shaped like a lemon.

Crop: Red worms have a crop or storage compartment for food before it moves to the gizzard.

Esophagus: Once food is taken in through the pharynx the food particles go through the esophagus and on to the crop.

Food particles: Soil or organic material passes through a red worm's tube-like digestive system before it is broken down and excreted as castings or vermicompost.

Gizzard: A red worm has a tube-like digestive system. As food particles are ingested, they enter the esophagus and may be stored in the crop before going to the gizzard. Red worms often store small rocks in the gizzard to help grind up food particles before they pass them on to the intestine.

Hearts: Red worms have five pairs of hearts.

Intestines: As food passes through the intestine, nutrients are taken in and the food is digested.

Mouth: Red worms do not have teeth. They use their highly muscular mouth, pharynx and gizzard to break up food particles. A sensitive tongue-like lobe located above the mouth called a "prostomium" is used as a sensory device.

Pharynx: Red worms push their pharynx or throat out of their mouth to grab food particles.

Posterior: The tail end of the worm.





Student

Warming Up to Worms

1. Draw or sketch your worm:

2. What color is the worm? _____

3. What shape is the worm? Describe it. _____

4. How does the worm's skin feel? _____

5. Is there a difference between the top side and bottom side of a worm? Describe what both sides are like.

6. Can you tell where the front end of the worm is and where the tail is? How do you know?

7. Does a worm have the following:

a. Ears? Yes No

d. A nose? Yes No

b. Eyes? Yes No

e. A mouth? Yes No

c. Legs? Yes No

8. Describe the similarities of a worm's anatomy to a human's anatomy.

Describe the differences.

9. How does your worm move? Describe it. _____

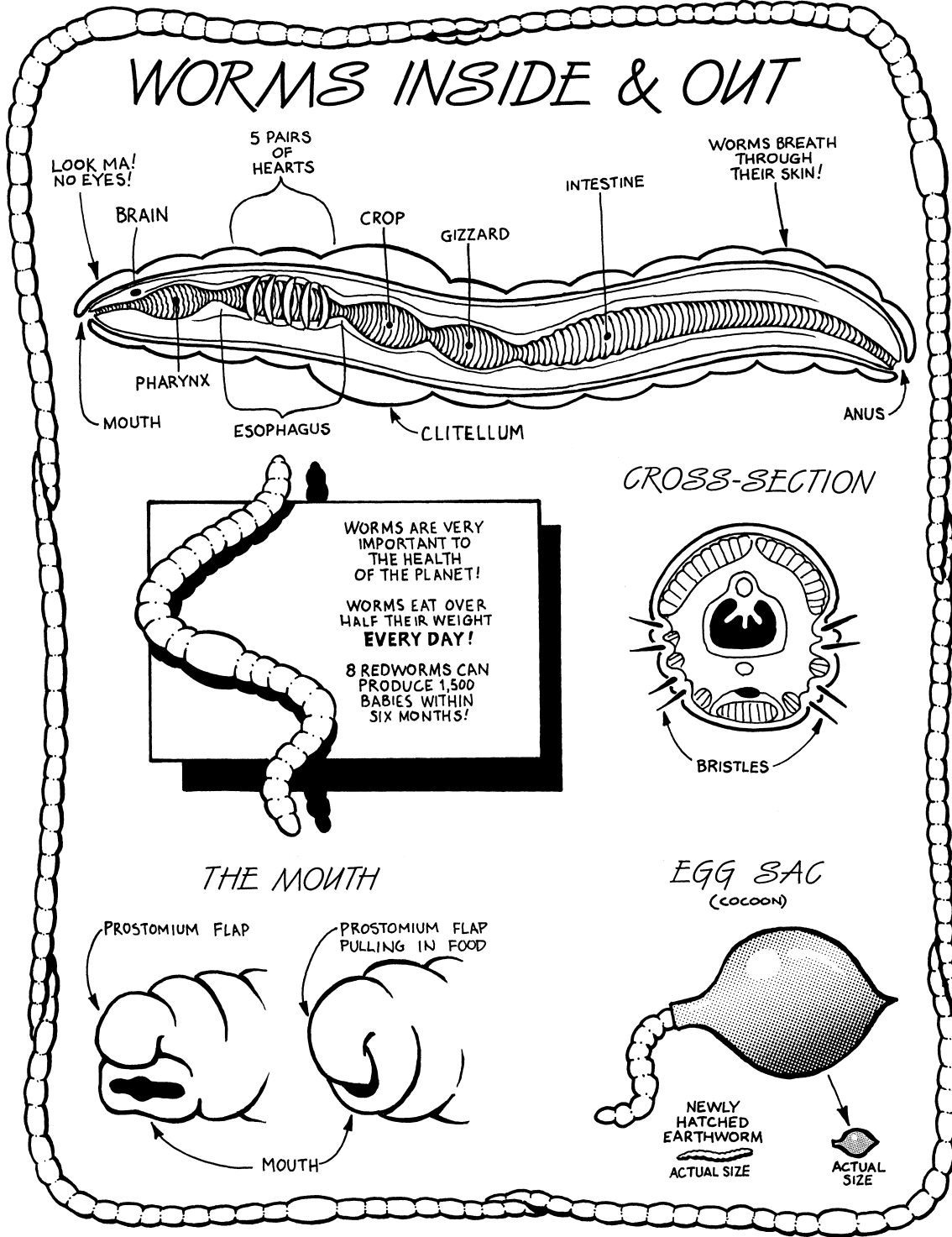
10. Do you have an adult or immature worm? Describe the difference. _____

Name: _____ Date: _____





Worms Inside and Out



Name: _____

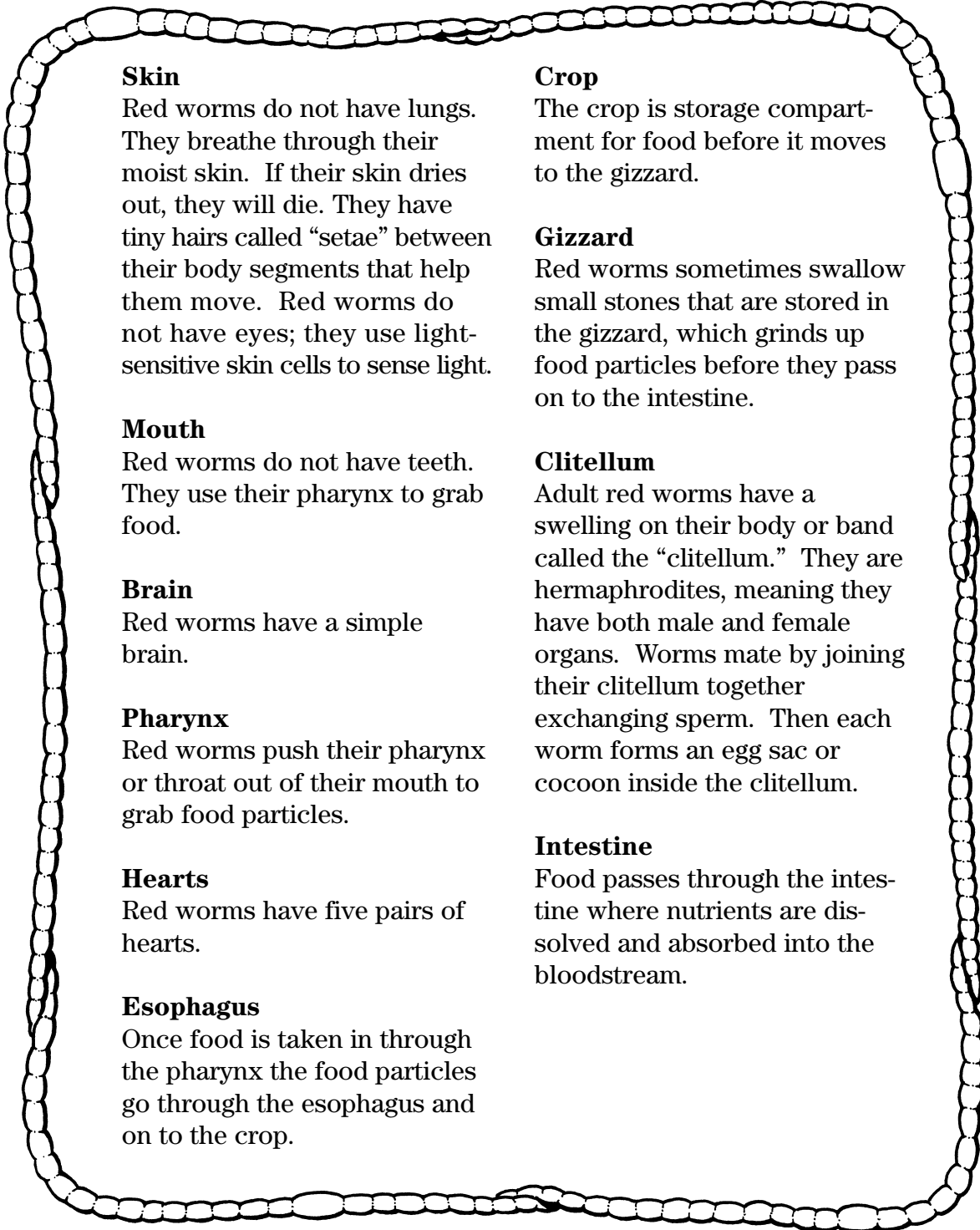
Date: _____





Student

Worms Inside and Out



Skin

Red worms do not have lungs. They breathe through their moist skin. If their skin dries out, they will die. They have tiny hairs called “setae” between their body segments that help them move. Red worms do not have eyes; they use light-sensitive skin cells to sense light.

Mouth

Red worms do not have teeth. They use their pharynx to grab food.

Brain

Red worms have a simple brain.

Pharynx

Red worms push their pharynx or throat out of their mouth to grab food particles.

Hearts

Red worms have five pairs of hearts.

Esophagus

Once food is taken in through the pharynx the food particles go through the esophagus and on to the crop.

Crop

The crop is storage compartment for food before it moves to the gizzard.

Gizzard

Red worms sometimes swallow small stones that are stored in the gizzard, which grinds up food particles before they pass on to the intestine.

Clitellum

Adult red worms have a swelling on their body or band called the “clitellum.” They are hermaphrodites, meaning they have both male and female organs. Worms mate by joining their clitellum together exchanging sperm. Then each worm forms an egg sac or cocoon inside the clitellum.

Intestine

Food passes through the intestine where nutrients are dissolved and absorbed into the bloodstream.

Name: _____

Date: _____



DEFINITIONS

Vocabulary:

Blood: the fluid in an animal's blood vessels that carries food and oxygen to the cells throughout the body.

Crop: a pouch-like compartment to store food, before it is ground up, that is found in many birds and insects.

Digestion: the process of breaking down food into small molecules that can be absorbed by the intestine and used by the body.

Esophagus: the muscular tube that leads from the pharynx to the stomach (or in some animals to the crop) and pushes food through this part of the canal.

Gizzard: a second stomach with a thick muscular lining found in birds and other animals where food is ground up. Worms sometimes store small stones in their gizzard to help grind up their food.

Heart: the muscle in animals that pumps blood through the body.

Intestine: the long tube in animals where food is digested and absorbed into the body.

Pharynx: the part of the canal between the cavity of the mouth and the esophagus.

