**Lesson Plan: As the worm squirms**

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**Introduction to Lesson Plan:**

The world has many different kinds of animals and some of them are worms? What is a worm? What different kinds of worms are there? What animals look like worms but aren’t? How do we know?

In this lesson, students will discuss types of worms: flatworms, roundworms, segmented worms, with some living examples. Students will learn basic ideas of classification and will classify an unknown worm.

We also include 2 optional follow-up activities with worms: 1) a basic regeneration lesson (with our planarian flatworms) and 2) a field collection activity.

**List of Standards Addressed:**

From Georgia Standards of Excellence (5th grade standards):

“S5L1 – Obtain, evaluate, and communicate information to group organisms using scientific classification procedures.

1. Develop a model that illustrates how animals are sorted into groups (vertebrate and invertebrate).”

**Learning Objectives:**

Students will define what it means for an animal to be a “worm” and why this term can be a little confusing.

Students will understand differences between three categories of worms: roundworm, flatworm, segmented worm.

Students will discuss and use a model for classifying an unknown worm.

**Appropriate Grade Levels:**

5th

**Suggested Group Size / Number of Students:**

A classroom of 25-30 would be appropriate, but suggestions are given for dividing students into smaller groups for work.

**Setting:** Indoors. An optional activity is listed for field collection (outdoors)

**Approximate Time for Lesson:** 1 hour, with options for 1 additional hour on a second day/visit.

**Resources/Materials Needed for Students:**

Petri dishes or other clear containers with lids (e.g. Ziploc tub, washed jar)

Worms collected from outdoors or obtained from a company like Carolina Biologicals

(e.g. living specimens like planarian flatworms, earthworms, or *C. elegans*; fixed/preserved specimen like tapeworm). Our goal is to have at least 3 specimens in duplicate so that we could have 6 smaller groups.

Gummy worms

Worksheet for drawings, observations, and classification.

Pencils (and/or colored pencils, crayons, markers).

Rulers

*Optional:* Microscope and/or magnifying glasses.

 Models of specific worms (we have a planarian model).

**Resources/Materials Needed for Educators:**

Lesson plan/teacher’s notes.

Posters or Powerpoint presentation with images types of worms (Provided)

**Lesson Activity:**

1. Drawing: Teacher asks students to draw a worm. (2 minutes)
2. Discussion: What do your worms look like? Are they small or large? What color are they? Where do you think your worm would live? During this conversation, students might reveal that they have drawn different types of worms. (5 minutes)
3. Teacher presents the idea that there are many kinds of worms. Images in PPT show earthworms, land planarian, aquatic planarian, marine flatworm, tapeworm, roundworm (*C.elegans*), polychaete. Narrative: Just like there are many kids of birds or plants in the world, there are also many types of worms. Some live on land, while others live underground, in freshwater, in the ocean, or even in other animals’ bodies as parasites! Some are very small and others can be many feet long! Some are colorful, while others are see-through or blend into their environment. (2 minutes)
4. Discussion: What do you notice about these worms? What do they all have in common? How are they different? (3 minutes)
	1. E.g. they are all long and skinny, that they don’t have legs, etc.
5. Discussion: What are animals that look like worms but aren’t? (5 minutes)
	1. E.g. slugs, snakes, grubs, etc.
	2. Instructor shows slide with some animals that look like worms but are not: amphibian, snake, etc.
	3. Continued discussion: how can we tell that an animal is not a worm? (e.g. that it has a spine/backbone, that it has feet/legs, that it has antennae)
6. (Note: this section could be simplified if necessary.) Introduction of the idea of classification. Scientists assign animals to groups with special names. Today we’ll talk about worms in 3 phyla. A phylum is a level of classification of living things. We’ll talk about the following worm phyla:
	1. Flatworms (platyhelminthes)
		1. Fun facts: Some flatworms can regenerate, or grow missing parts after injury. Some flatworms are parasites and can grow in the human body; some tapeworms can be over 10 feet long!
	2. Roundworms (nematoda)
		1. Fun facts: Nematodes are the most abundant animals on the planet. Many of them are too small to see with our eyes. There can be 1000 in a half cup of soil.
	3. Segmented worms (annelida)
		1. Fun facts: Earthworms breathe through their skin.
	4. Discussion of some of the characteristics of each phylum.

(Humans are in the phylum chordata that contains all vertebrates – animals with a backbone, as well as other species that have a backbone-like structure earlier in development.) (5 minutes)

1. Activity: Observations of worms. In small groups, students handle live worms (in containers) or preserved samples of worms. Students draw each worm and talk to each other about what the worm looks like. At regular intervals, the groups switch samples so that they have a chance to look at 3 examples. (20-25 minutes).
2. Activity 2 / Assessment: The instructor hands out a gummy worm to each student. Each student is asked to draw/describe the gummy worm and to assign the gummy worm to a category (roundworm, segmented worm, flatworm). Students are asked to defend their choice. In discussion, emphasize that there might be more than one correct answer. \*Note\* the result of this might depend on the candies available. What else could we look at to be more sure of our choice(s)? (10-15 minutes). Students can eat the gummy worms if they choose. ☺

**Final Product/Assessment:**

Each student will generate a handout with their observations/drawings on it. They will draw a worm at the beginning of class, draw/describe 3 real life examples, and then draw/describe and categorize a gummy worm.

Optional: We could develop a writing activity to support the classification of the worm (1 paragraph to 1 page) to introduce an element appropriate for writing standards.

**Potential companion activities:**

1. Students explore outside and find worms that they proceed to identify/classify.
2. We can plan, together with the instructor, a follow up lesson plan on planarian regeneration.

*Optional materials if field collection were used as a part of this lesson:*

Petri dishes or other clear containers, scoops or spoons to move animals, gloves

*Optional materials for follow-up lesson on planarian regeneration:*

Petri dishes or other clear containers (we like the Ziploc containers)

Planarians (obtained through the Roberts-Galbraith lab, field collection, or from commercial source)

Plastic spoons or knives for amputation

Spring water