Week 6 (Fall) - Wonderful Worms

*For those looking to start composting, information has been provided at the end of the lesson. This also ties into the lesson for Week 10.

Prep/Materials

- If you would like your group to observe live worms, collect some from your compost or garden. Worms can also be purchased at many plant nurseries.
- Provide magnifying glasses for kids to observe worms' bodies.
- Locate the "Simple Worm Anatomy" diagram at the end of the lesson. This is helpful to view before observing live worms.
- (Optional) Supply rulers that could be used to measure worms' bodies.
- (Optional) Have a seasonal snack prepared.
- If you have a garden, find an area where you can dig for worms within the space.

★ Warming up to Worms (2 - 3 minutes)

- Tell the class that we are going to be looking at worms under a magnifying glass to identify worm body parts.
- Explain that worms are **decomposers**. That means that they can break down organic (once living) material and turn it into nutrients for the soil. **When the organic matter exits the worm's body, it is known as worm castings.**
- Further explain how important of a role worms play in the garden. Not only do they make the soil nutrient rich, but they create underground tunnels that allow water and oxygen to get to plant roots.

★ Worm Examination (10 minutes)

- If using live worms, get your hands slightly damp and show the class one of the worms.
- Use the diagram to point out the various body parts (you will go into more detail when the kids examine the worms) and share some interesting worm facts.
- Use a plate and cover it with damp soil. Then add your worm/s to the soil for observation.
- Invite the kids to sit around the plate. Give them magnifying lenses for better observation.
- If children handle the worms, ensure that hands are clean and damp. The worms should not be kept out of the soil and moisture for too long. They can quickly get burned.

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- Some things to point out as you observe the worms.
  - Find the **head** (anterior end). It is the end with the "flap" which is above the opening for the mouth. It is like a fat upper lip. Worms don't have teeth, but rather a gizzard that grinds down material so that it can run through the long intestine of their bodies and come out as nutrients.
  - Find the **clitellum**. It is the thick band encircling the worm. This contains cocoon/egg material.
  - Find the **intestine**. It is the long dark line running through the body. Ask, "Can you see the food moving through the worm's intestine?"
  - Observe the worm's **segments** that look like little rings that are stacked all along the worm's body. These segments are covered with bristles called **setae** that help the worm move and burrow deep into the soil.
  - Observe a worm moving. Notice the muscles contracting (shortening) and relaxing (lengthening).
- (Optional) Distribute rulers and allow children to measure the length and width of a worm by **carefully** stretching the worms' bodies. Who can find the longest worm? What about the thickest?
- After examining the worms, carefully return them to the soil or compost.
- Have the kids wash their hands.

★ Snack (2 minutes)

- (Optional) Pass out a seasonal snack. Ask the kids to imagine what it would be like to eat the food without teeth, but rather a gizzard. (It would feel like grinding all of their food with their back teeth.)

★ Worm Fact or Fiction (2 - 3 minutes)

- Use this opportunity to review the difference between **fact and fiction**, while sharing more interesting worm details. (A suitable activity to do while kids are snacking.)
- Share these details and ask the kids to see if they can determine (or remember) if the information is fact (proven to be true) or fiction (created by the imagination).
  - An Earthworm is both a boy and a girl. (**Fact** - it takes two worms to make a new worm, but each worm contains the anatomy of both a boy and a girl.)
  - If you cut a worm in half, it will become two living worms. (**Fiction** - a worm cut in half will not survive.)

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- Earthworms eat oranges to get their Vitamin C. (**Fiction** - citrus food is too acidic for their bodies.)
- Earthworms have five hearts. (**Fact** - Earthworms contain five tiny hearts.)
- Earthworms have bones that run down the length of their bodies. (**Fiction** - worms are invertebrates, which means they don't have any bones.)
- The longest Earthworm ever discovered was named Dave. (**Fact** - he was 15.75 inches long and discovered in the United Kingdom).
- Worms have lungs, like you and me. (**Fiction** - they breathe through their skin.)
- Worms do not have ears. (**Fact** - they hear through vibrations that they feel throughout their bodies. Compare this to the way you might feel the vibrations of a drum or if you are standing next to a loudspeaker.
- A worm can reproduce new worms when it is one year old. (**Fiction** - after being only six weeks old, a worm can reproduce and lay eggs for new worms.)

Garden Activity (5 - 10 minutes)

- Find a spot in the garden or compost where the kids can dig for worms. Remind the kids how fragile worms' bodies are. They will need to dig and move the soil with care.
- Walk around and see what has changed in your garden since last week.
- Point out the peas. Do you need to plant more seeds? Do some of the tendrils need some support attaching to a structure?
- Check the cool season crops. In a few weeks, you will harvest and make a salad. Maybe throw in some radishes (they have a seed to harvest turnaround of 25-30 days).
- How are the potatoes doing? Once a sprout is 6 inches tall, you will create a small soil mound around the base of the stem. This creates more space for potatoes to grow.
- Allow the kids to carefully water what has been planted.

✓ Closing Activity (5 minutes)

- Read to the kids the picture book, Winnie Finn, Worm Farmer by Carol Brendler. (This book gets students' wheels turning for Week 10's lesson that explores composting.)
- (Optional) Share the compost information provided on Pages 36 and 37.

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✓ (Optional) Worm Breathing

- Although humans cannot technically "breathe" through their skin, this exercise encourages calm breathing and awareness of the fresh air surrounding the children.
- Have the kids lay on their backs and tell them to make their bodies long like worms.
- Prompt them to close their eyes and take a deep inhale through their noses and into their lungs.
- Instruct the kids to slowly exhale and imagine the air (or carbon dioxide) leaving through their mouths.
- Repeat this process, but also encourage the kids to imagine fresh oxygen is also being absorbed through their skin as they inhale.
- Then have them take a long exhale.
- Repeat this process a few times until kids get wormy squirmy.

Children quickly get over any squeamishness when they learn how worms are fascinating to study and essential for healthy plants!

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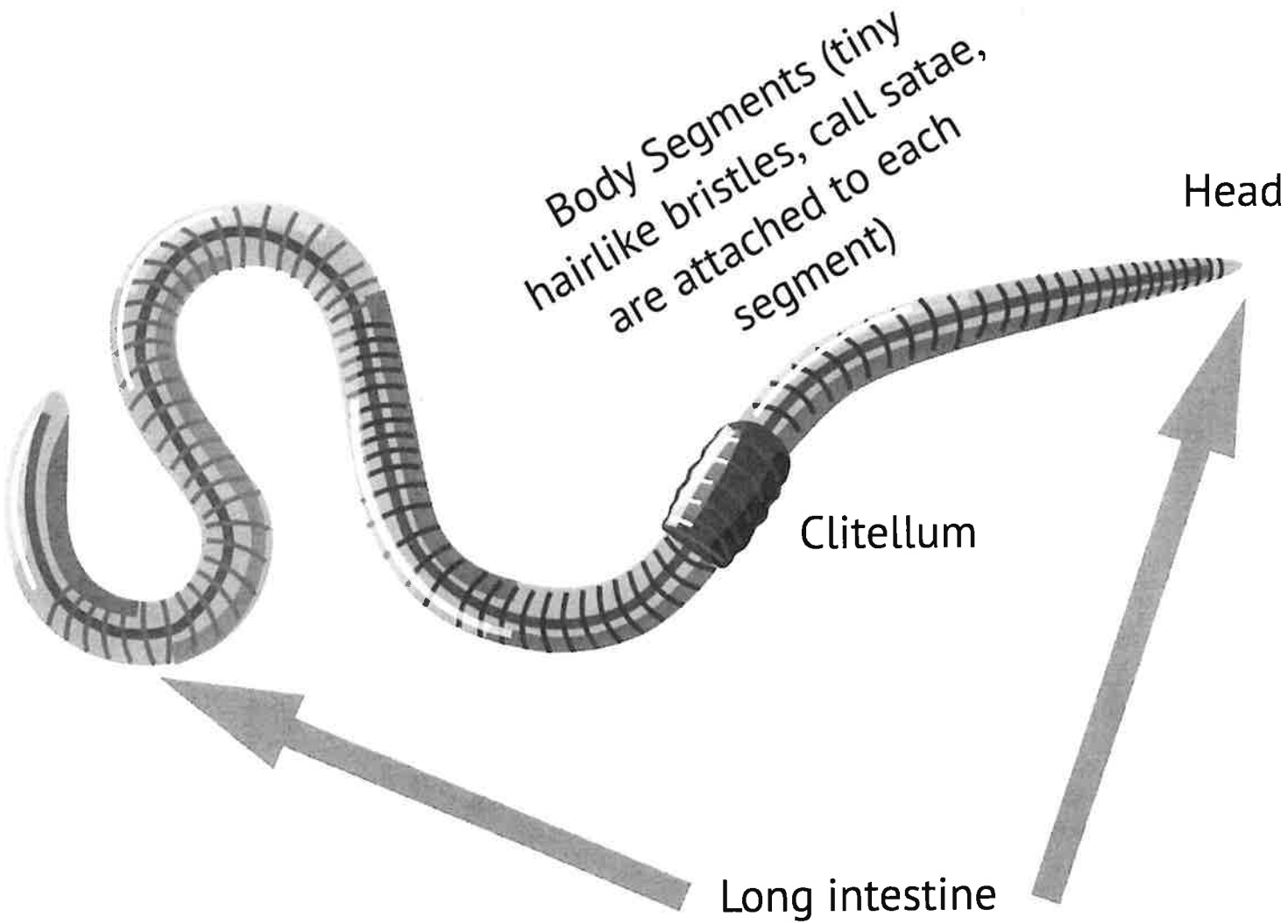
Simple Worm Anatomy



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Composting

Composting benefits both the planet and your plants!
Create some vitamin-rich compost soil that your garden will love while teaching children the science of decomposition.

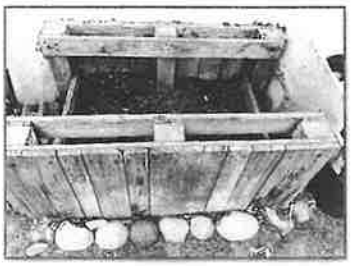
Start Indoors

1. Collect kitchen scraps, such as coffee grounds, raw fruit and vegetable peelings, tea bags, crushed egg shells, dryer lint, etcetera.
2. Keep scraps in a bag that is kept in the freezer, or get a small compost bin that you can place by or under the sink.

3. If you choose a countertop bin, it is recommended to have **a charcoal filter**. Otherwise, your indoor composter will become infested with fruit flies!

Outdoor Compost

1. Outdoor compost can be done by locating a shady spot that is near your garden and a water faucet.



2. If you decide to make a structure to hold your compost, bins can be constructed with a variety of materials. The composter pictured was made with a pallet of wood and chicken wire on the sides to allow ventilation.
3. Other DIY methods include a 5-gallon bucket that includes a lid with small holes, a large plastic tote box, a bin made with walls of wooden latticework, or even a large cardboard box,
4. A cover for your compost is recommended, but not necessary. If you do not use one, thoroughly bury any food scraps to keep unwanted pests away.

5. If you are looking to purchase a composter, there are many great options available for purchase. The composter pictured here provides the materials to get started, and will eventually create full trays of rich compost to add to the garden. It also has a spout at the bottom for collecting "compost tea." This is an excellent fertilizer in itself to add to your plants.

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Compost Science

1. The key is to keep a healthy Carbon to Nitrogen ratio within your compost bin. It can get complicated, but it doesn't have to be.

2. If you are new to composting, keep it simple and aim for 50/50 Carbon to Nitrogen ration. Roughly add 50% greens (grass clippings and kitchen scraps) and 50% browns (leaves, straw, cardboard, eggshells, etcetera).

3. When starting your compost, begin with a 4-inch layer of dry brown materials. Then add a layer of green materials, which tend to be moist. Continue to layer with dry (brown) and damp (green) and to promote that 50/50 balance. If your compost begins to smell, this is an indication that the material is too wet. Adjust by making your dry layers thicker.

4. When the organic material starts to break down, it becomes food for decomposers like beneficial bacteria, fungi (such as mushrooms), and earthworms. The decomposers recycle the organic material into Carbon and Nitrogen, both essential nutrients for thriving plants.

Earthworms

1. In nature, earthworms decompose organic material and also create underground tunnels for the soil to receive ventilation and water.

2. In a composter, the worms do the same work, while also creating worm castings and worm tea that are rich in nutrients and can be added to create nutrient-rich soil.

3. Earthworms can be found by digging in the soil. You can also purchase them online or at your local nursery.

4. The most beneficial worms to include in your composter are Red Wigglers or Redworms.

5. Remember also to keep the compost moist (for your worms), but not too damp.




Composting is very rewarding.
For children, it also allows them to experience decomposition first-hand.

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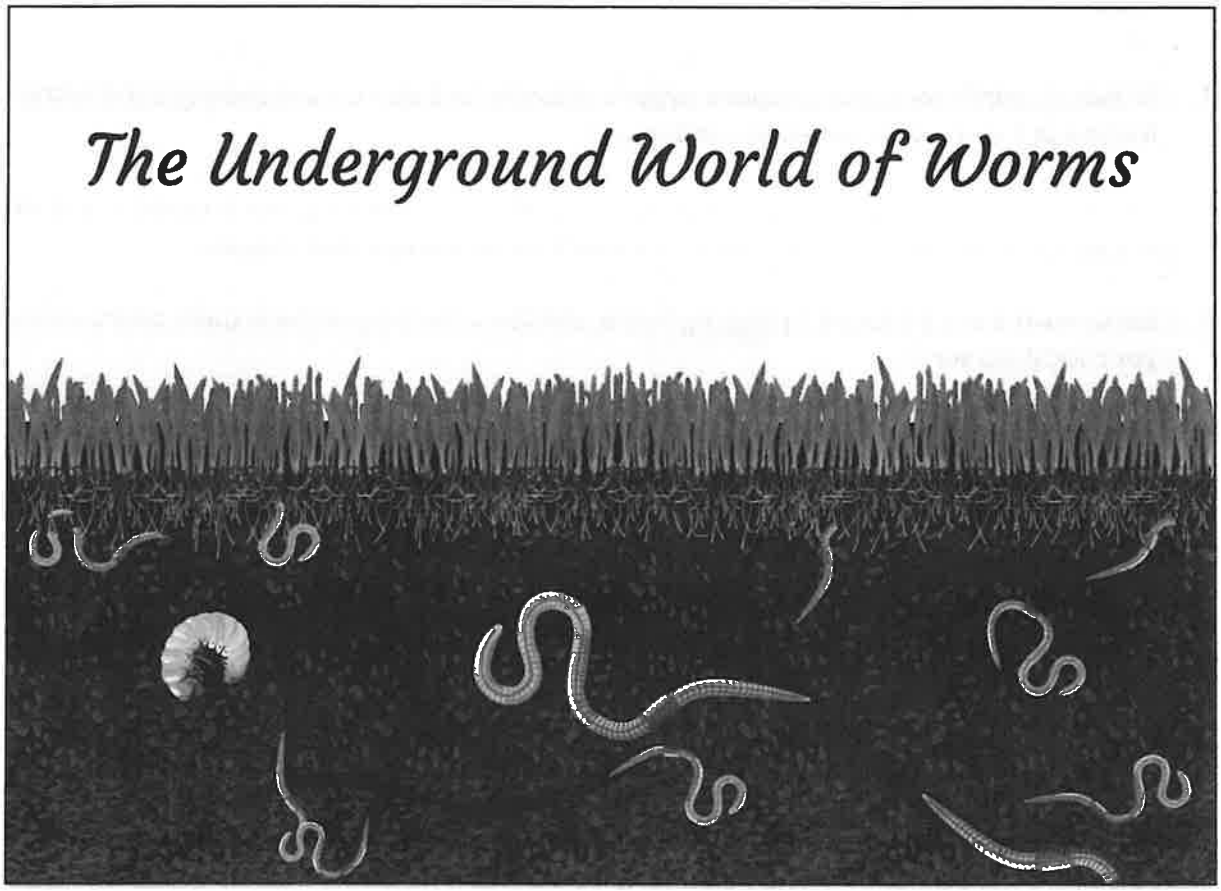
Getting up close and personal with these squirmy garden helpers. Observe the ring-like body segments!



Worms create underground tunnels that allow water and oxygen to reach plant roots.

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Worms

GARDENING ACTIVITY

Summary:

Groups will build a worm hotel and then observe how worms behave.

Why Do This?

Worms are great garden helpers. Members will come to appreciate how they help the garden and soil by observing their behavior.

Some Helpful Information:

Worms can devour their own weight in animal, leaf and other plant matter every day. As they chew their way through the soil they mix and aerate it as well as depositing lots of nutrients in the soil. Worms are one of nature's important recyclers. They take old decaying matter and turn it into rich soil that can provide nutrients for a whole new crop of plants. When you see a worm in the garden keep it out of harm's way.

Time:

1 hour

Materials:

worms, 2 per group (from soil or bait shop)
potting soil, clean sand and garden soil
large opening, large clear glass jars
small tin cans
spray bottles
old screening, or perforated lid to cover jar and allow air circulation.
rubber bands to hold screening
worm food: old leaves, coffee grounds, cornmeal, tiny fruit and vegetable scraps
black construction paper
tape

Preparation:

1. Gather materials and review procedure.
2. Depending on the size jars you have you will need more or less soil. (See directions for building a worm hotel:) Try setting up a worm hotel so you can estimate if you have the right amount of soil, etc. If you use gallon jars (often available from delis and restaurants) you can use 3-4 worms per container.
3. IMPORTANT! Be sure the jars don't dry out or get hot. This would kill the worms! Someone has to care for them over the week between meetings. A cool dark place is ideal for letting them sit. A light spray of water should keep them moist (not soggy.)

Step by Step:

1. Ask if anyone has seen worms. Does anyone know why they come above ground when it rains? (They are escaping soggy tunnels where they can't breathe.)
2. Distribute the handouts. Have everyone look them over and draw a worm.
3. Have each group make a worm hotel using the illustrated directions.
4. Distribute damp paper towels and worms. Have every one complete the handouts.
5. Place worms in their hotels.
6. Next week have everyone answer the final questions on their handouts.
7. Release the worms in the garden.

Extensions:

- Time how long worms take to burrow.
- Try starting seedlings in a pot that has a worm and try one without. Is there any difference?

Handout #2 • Gardening Activity

DRAWING & WRITING ALL ABOUT WORMS!

1. What color are your worms?

2. Do they look like your drawing?

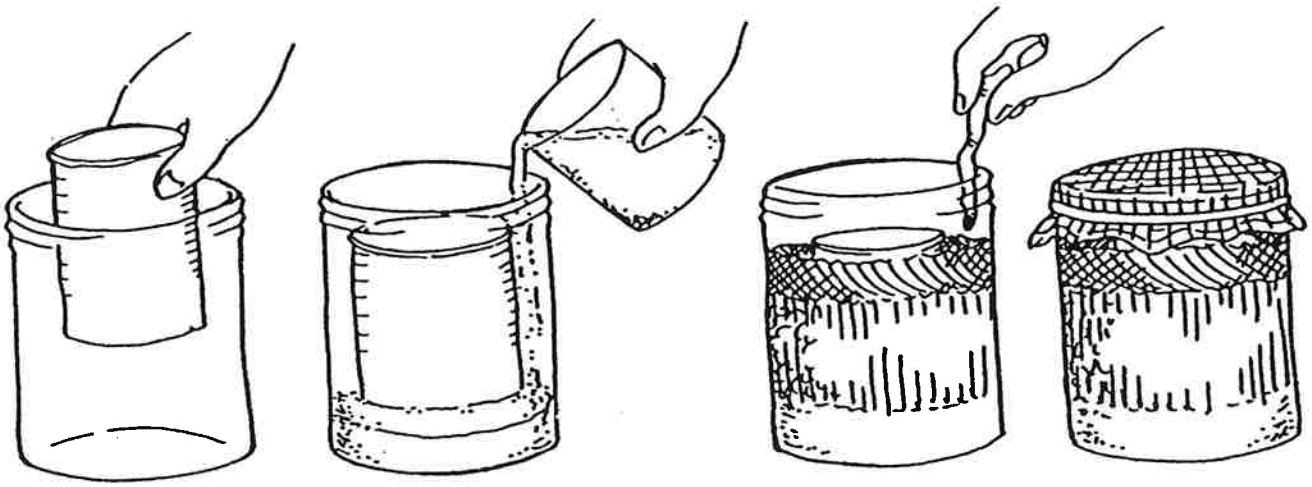
3. Make another drawing.

4. Do you see the lighter color wide band where the baby worm eggs come from?

5. Draw your worm hotel:

6. How might it look next week?

Handout #1 • Gardening Activity
WORMS



How to Build a Worm Hotel

1. Place can open end down in center of jar. (The can will encourage the worms to stay out at the edges of the jar where you can see them.)
2. Place a 1-2 inch layer of sand in the jar, keep can in the center of jar.
3. Next make a layer of garden soil deep enough so the jar is 2/3 full. Be sure can doesn't move. LIGHTLY pack soil so it fills the container. You don't want it packed tightly!
4. Fill jar up with potting soil, pack lightly. Leave 1-2 inches of jar empty. Draw a picture of your "hotel" on your handout showing the layers of sand, garden soil and potting soil.
5. Make a SNUG fitting black cover for the hotel. Hold it with tape.
6. Dampen the soil thoroughly. Be sure it's not soggy.
7. Make small mounds of different worm foods on the surface around the edges.
8. Gently place the worms on the potting soil. Leave the jar covered for a week before looking in on the hotel guests.

7. Draw the hotel again:

8. What differences do you see?

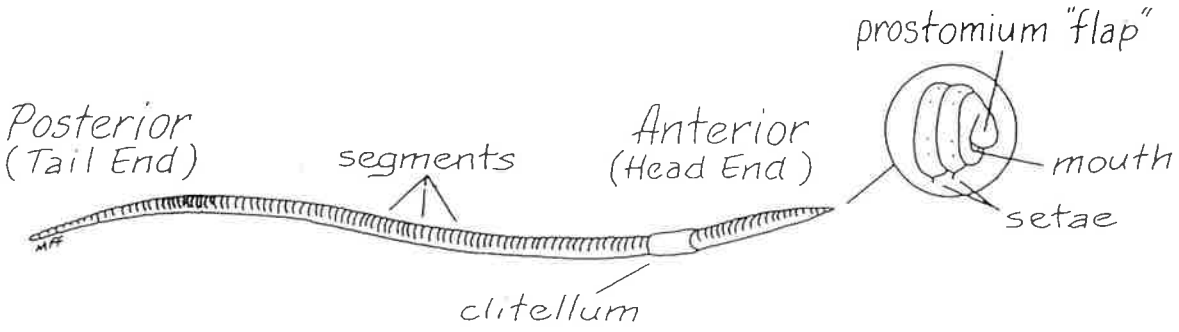
9. Did they eat all their food? Did they like one food better than another?

10. Why do you think worms would be good to have in the garden?

Name_____ **WORMS: WORM BODY QUIZ**

Wormformation

The shape of a worm is long and thin. It has a soft body and it has no bones beneath its skin. The body of a worm is made of many little rings with grooves between them. Each of these rings is called a segment. Each segment has bristles called setae that help the worm move. A worm has no arms, legs, or eyes.



Directions

Read the *Wormformation* and look at the earthworm diagram to answer the questions. *(Hint: Use the glossary for extra help.)*

1. What is the basic shape of a worm?_____
2. Does a worm have arms or legs?_____
3. Does a worm have a mouth?_____
4. The prostomium is a flap above the worm's_____
5. Does a worm have eyes?_____
6. What is the head end of a worm called?_____
7. What is the tail end of a worm called? _____
8. What is the name of the swollen band?_____
9. What are the rings on a worm's body called?_____
10. The bristles that aid in a worm's movement are called_____

Bonus Activity Look at a real worm. Identify its parts.

Source: Worms Eat Our Garbage