

VERMICOMPOSTING

1 Hour Basic Presentation
with
Worm Bin Exploring or Building

Santa Clara County Master Composter
K-12 Education Program

NOTES FOR VOLUNTEER

What to bring to the Presentation:

- SCCMC Name Tag
- Materials for either the Worm Bin Building or Sorting activity.

Other Stuff:

- Make sure you are parking in a legal Visitor parking spot and not in a Staff parking spot.
- Always check-in with the office first as you will need to sign in and possibly get a visitor tag.

INTRODUCTION

- Good Morning/Afternoon?
- My name is _____ and I'm really excited to come today to talk with you all today. Do you know what I'm here to talk about?
 - Do they need a Hint? Have students stand up with feet together, arms together above their head and wiggle like... Worms! Show photo!
- We are also going learn all about how to take care of and how to feed worms so that they can provide us with awesome nutrients and food for your school garden.



Vermicomposting

COMPOSTING

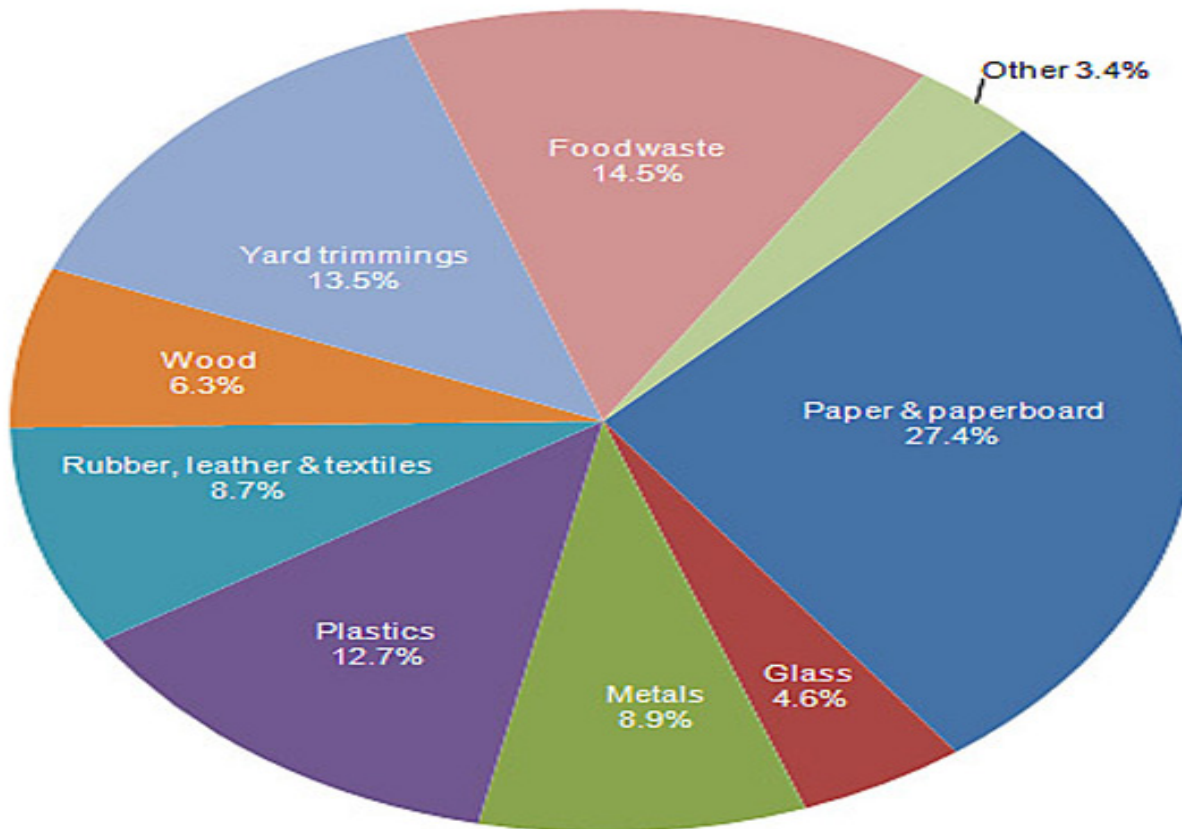
Let's first discuss Compost

- What is Compost
- Why do we need to Compost

The Compost Story

- <http://kisstheground.com/thecompoststory/>

Figure 5. Total MSW Generation (by material), 2012
251 Million Tons (before recycling)



VERMICOMPOSTING

- Now lets discuss composting with worms. Raise your hand if you know what vermicomposting is?
 - Vermicomposting is cultivating worms to eat our food and paper water to produce compost. L
- Why?
 - Worms are easy, tidy and odorless
 - Bins are small
 - Can be done indoors, on the patiom or in the basement or garage, outside under shade.
 - Can be done all year round.
- What do worms make?
 - Vermicompost... also known as
 - Worm Compost, Worm Castings, Worm Manure
 - A organic Soil Conditioner
 - rich in microbiology, fungi, good bacteria and minerals
 - Relitively Low in nutrients
 - Worms also make ... more worms!
 - Worms can double every 3-6 months
 - 8 worms can become 1500 in 6 months



NATURES DECOMPOSERS

- Let's think back to fall when all the leaves fall off the trees and cover the ground.
 - Show picture of the Fall leaves.
- Now it's spring time. Did all of the leaves get raked up? Where did the leaves go? Did they disappear?
 - No, The leaves naturally decomposed because there are tiny living things in nature called decomposers that help break down dead things on the ground and turn them into healthy soil and food for plants and trees.



DECOMPOSERS AKA FBI'S

- There are three types of living things in nature that we call decomposers. They are called FBI'S:
 - Fungi (fun-j-eye)
 - Bacteria
 - Invertebrates
- FBI's
 - Consume and break down green and brown materials
 - Transform organic matter into a nutrient rich soil amendment.

FBI

**Fungi Bacteria
Invertebrates**

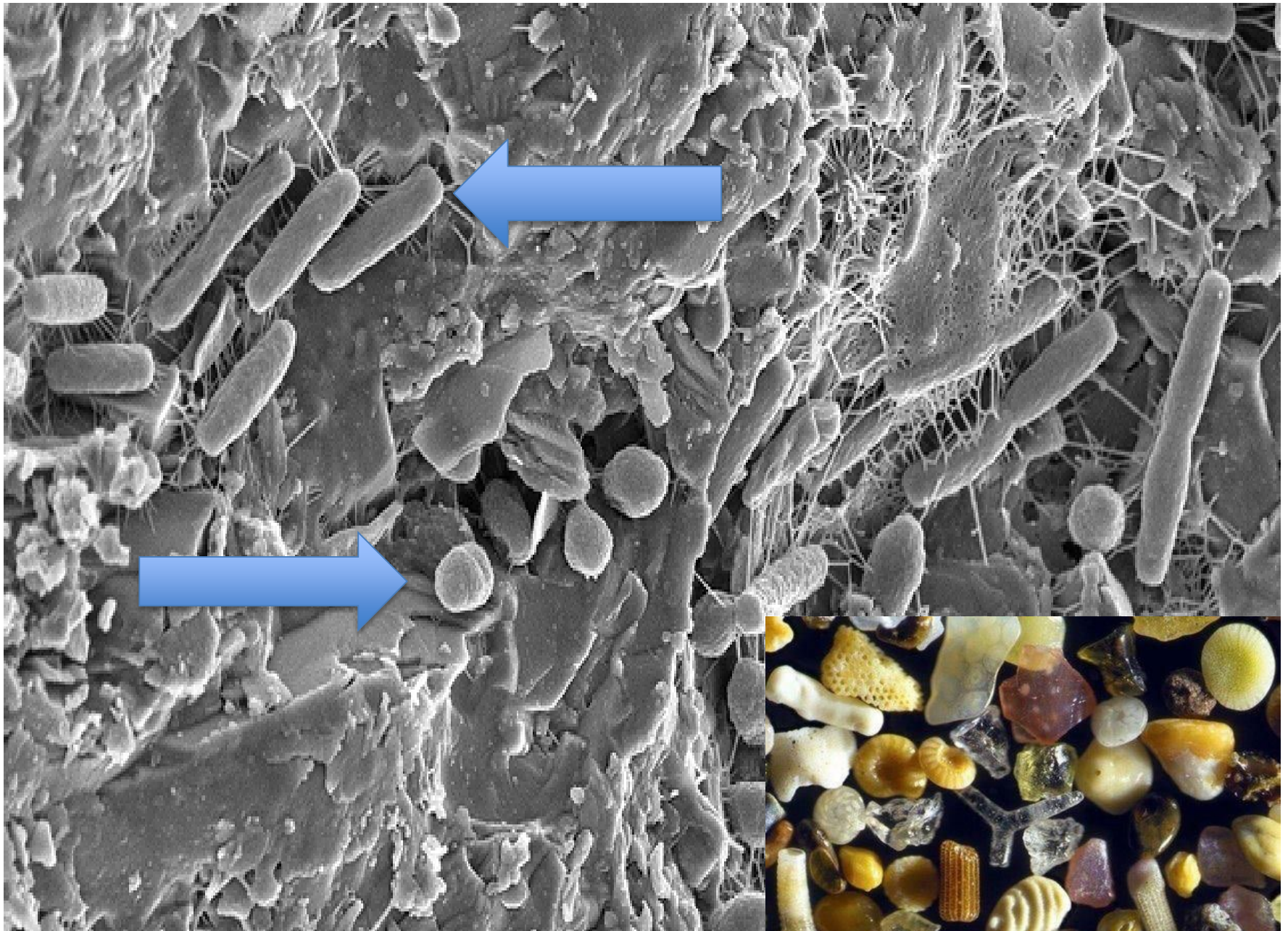
FUNGI

- Specifically Saprophytic Fungi convert dead organic material into nutrients.
- Fungi are microscopic cells that usually grow as long threads or strands called hyphae.
- They push their way between soil particles, roots and rocks.
- They convert hard to digest organic material into forms that other organisms can digest or use



BACTERIA

- Bacteria are really tiny . They are so tiny that we need a microscope to see them.
- Some Bacteria is bad and we call those germs and these bad bacteria can make us sick sometimes.
- But there are lots of good bacteria too.
 - Everyone blink your eyes. Did you know that there are good bacteria living on your eyelids and eye lashes that keep them clean?
 - Now everyone point to your stomach. Did you know that there are billions of good bacteria inside of us that help us digest our food?
- Show photo of Bacteria on a single grain of sand



INVERTEBRATES

- Invertebrates
 - are living things that do not have backbones like we do.
 - Show photos of invertebrates.



Sow Bug
Soldier Fly Larve
Millipede/Centepede
Snails or slugs
Beetles
Mites



WORMS

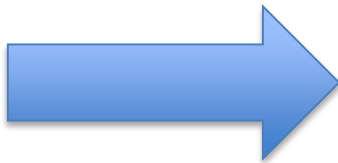
- Now back to our other invertebrates... worms! There are two types of worms. There are thousands of worm species that live in the soil. Lets discuss two very common worm species.
 - Earthworms or Night Crawlers (*Lumbricus rubellus*) are worms that you find deep in the soil.
 - Feed by pulling organic material and litter from upper layers into their burrows deep in the soil (termed anecic)
 - Red worms or wigglers (*Eisenia fetida*) are the worm we compost with. These are the worms that we use in worm compost bins.
 - Best worms for Composting.
 - Red worms feed in the upper layer of organic matter
 - They are happy in high population worm bins
 - Adapt to temperature fluxations easily.



Earthworms

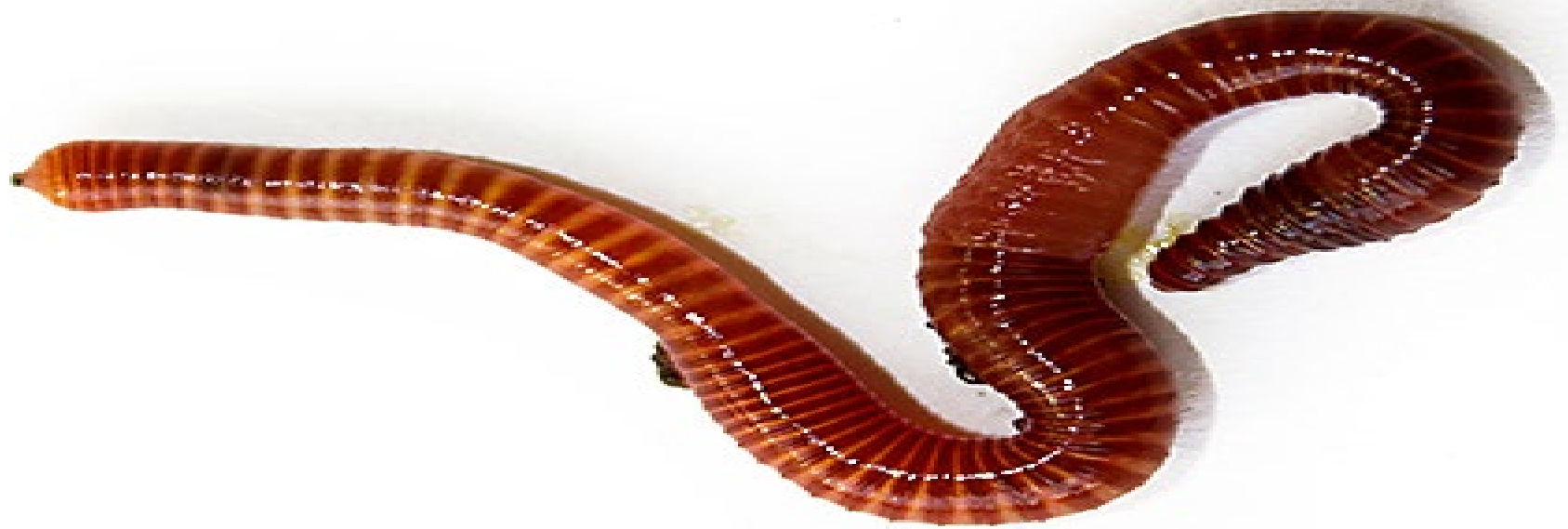


Redworms



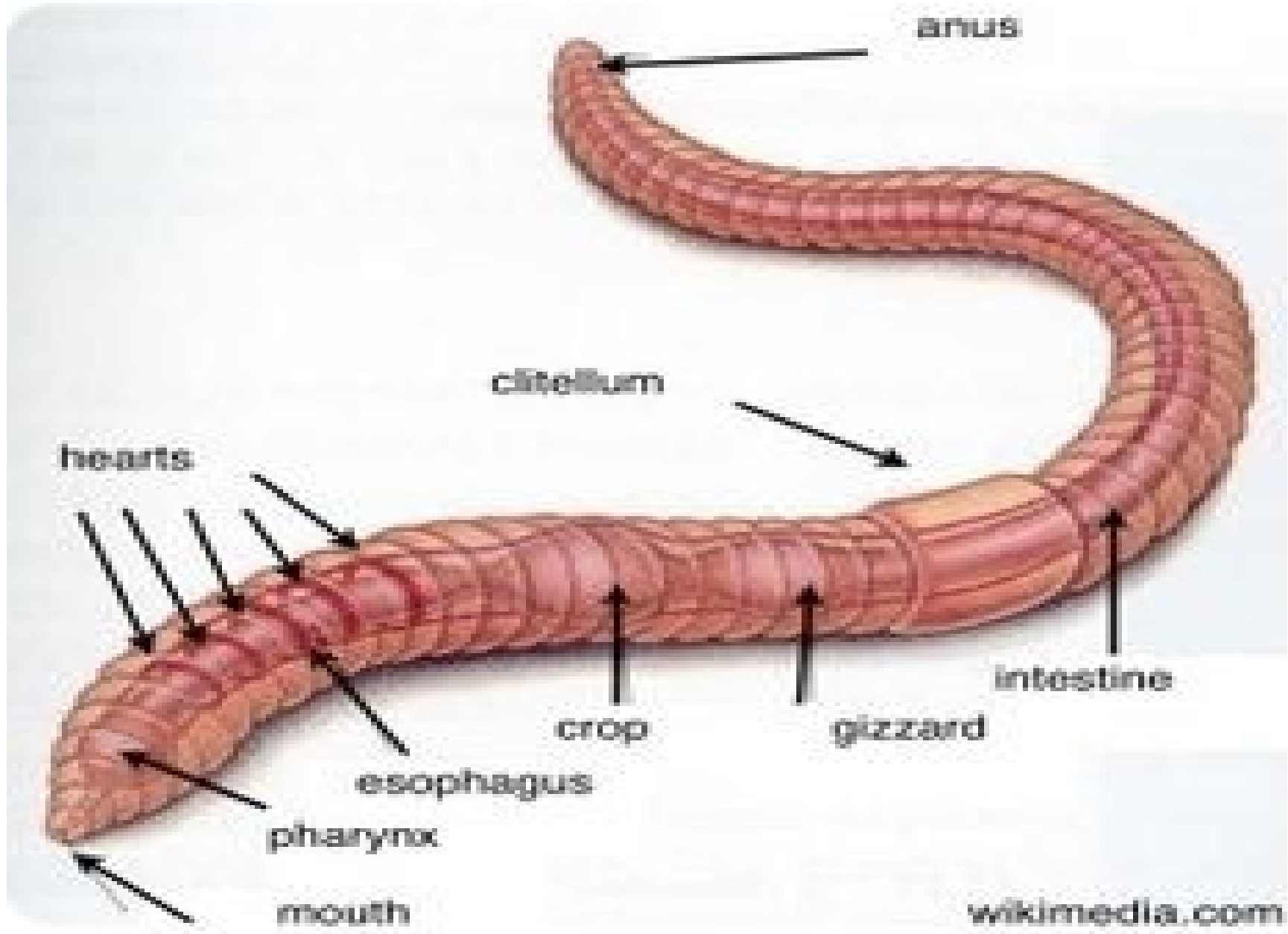
WORM'S DON'T HAVE

- Let's talk about worm body's for a little bit and Let's first talk about what worms don't have.
 - EYES: Point to your eyes. Worms don't have eyes. They see by feeling things with tiny hairs on their body. Show photo of hairs.
 - EARS: Point to your ears. Worms don't have ears. They don't need to hear but can feel vibrations.
 - LUNGS: Take a deep breath in and out. Worms don't have lungs like we do to breath air. Instead they breath through their skin and that's why it is important that a worms skin stays wet so that they can breath.
 - BONES: Let's feel our hands, how about our arms and legs. What do you feel inside your body? Bones? Worms don't have any bones.
 - TEETH: Worms don't have teeth. Instead they grind their food in there gizzard. Point to photo of gizzard.



WORMS DO HAVE

- Let's talk now about what worms do have...
 - Mouths: Worms have mouths. They look like elephant's trunks a little bit. It's like a flap and worms use them to scoop up their food.
 - Pharynx:
 - Esophagus:
 - Hearts: Worms have 5 hearts.
 - Crop:
 - Gizzard: where they digest food.
 - Clitellum:
 - Intestines:
 - Anus:



WORM LIFE CYCLE

This part can be left out. It's a little too much for TK-1st grades.

- Worms also have male and female parts. This means that ALL worms can reproduce and have babies. But there needs to be two worms in order to reproduce.
- When worms make baby's they join together by a mucus ring at their clitellums and exchange sperm.
- The mucus ring passes over the head of the worm as it hardens into a cocoon.
- Each worm can mate and lay one egg every 7 to 10 days.
- Baby worms hatch from one end of the cocoon in about 3 weeks.
- Worms take about 3 months to become adults.

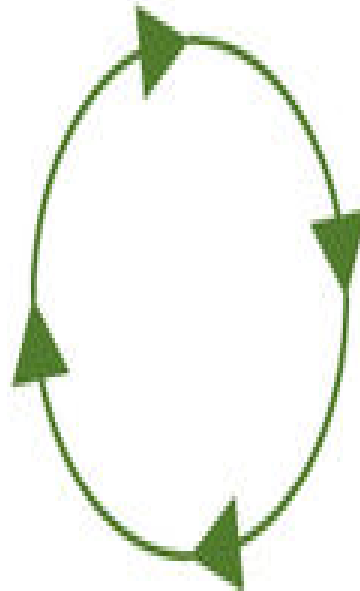
Worms join by a mucus ring exchange sperm



Worms take about 3 months to become an adult



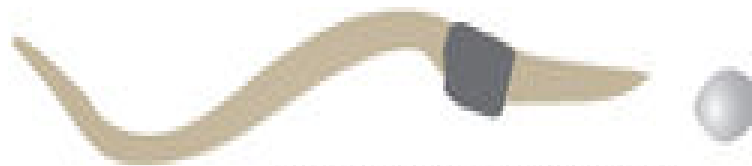
Baby worms hatch from one end of the cocoon at about 3 weeks



Mucus ring passes over the head of the worm as it hardens into a cocoon



Each worm can mate and lay an egg every 7-10 days



Egg fertilisation takes place in the cocoon after being released from the worm

WORM COCOONS

- So you might find a lot of Worm Cocoons in your worm bin and your castings.
- Cocoons are worm eggs and have 3-5 baby worms in each cocoon.
 - Show Photo of Cocoon
 - Can also pass around Bug boxes with cocoons in them.
 - Or mention that they will see coccoons when exploring the worm bin outside.



WHAT DO WORMS NEED

- Let's think about what you need to live now.
 - Worms need the same things we need to live.
 - Raise your hand if you can tell me what you need in order to live?
- Worms need four things
 - Shelter (Show students mini Bin)
 - Kept in shade and 40-95 degree temps
 - They like room temperatures like we do and should be kept inside or in the shade.
 - They also like it dark so the bin should be dark.
 - Air (Show holes in the shelter)
 - Water (wrung out sponge... not dripping)
 - Food (Worm Friendly)



Worm Shelter

- Here are some samples of worm bins.
- You can see the shelters give the worms plenty of Air.
 - Point out the holes in the bins.



WORM FOOD

- Worms need food just like us too!
 - Think about the size of worms compared to your body size. Is it smaller or larger?
 - If they are smaller we need to remember that their food needs to be smaller too! Make sure the food you put in the compost bin is cut up small!
- All worms are vegans. Does anyone know what vegan means?
 - Vegan means that they only eat food from plants.
- What kinds of food come from plants?
 - Fruit and Vegetable scraps, beans, nuts, seeds, plain grains (rice) and pastas, paper/egg cartons, eggshells, tea bags, coffee grounds and filters.
- How much food does a worm eat?
 - Worms eat half their weight daily. One pound of worms will eat $\frac{1}{2}$ pound of food per day. 3 to 4 pounds per week,



DON'T FEED WORMS

- Worms and Vegans do not eat anything that comes from animals:
 - Milk/Dairy/Cheese/Yogurt
 - Meat/Bones/Fish/Animal products
 - Eggs (Shells are ok and welcomed)
 - Oils: No cooked foods in oils or butters
 - Pungent Produce: Onions/ Ginger/Citrus/Garlic
 - Citrus
 - Salts/Seasoned Food
 - Dog/ Cat or Meat eating animal feces
 - Breads (mold allergies)
 - Yard clippings: May include chemicals, may be too woody.



Problems in the Worm Bin

- Fruit Flies, White Flies – Too much moisture or fruit/food waste. Always cover greens with thick layer of browns.
- Centipedes – Eat worm cocoons and young worms. Remove by hand.
- Pot Worms – Compete for food and means the PH is too Low or too much moisture. Add more browns and do not add any food waste for two weeks. A milk soaked slice of bread will attract pot worms and can easily be disposed of.
- Rodents – meat or greasy foods or bin is accessible. Need to prevent access.
- Smelly – Too many greens and/or moisture. Add more browns.



Fruit Flies



DRY



WET



CORRECT

WORM CASTINGS

- So the result of all taking care of your worms and the worms pooping is called Worm Castings.
 - Pass around container of finished Worm Castings.
- Worm Castings look a lot like dirt except:
 - It looks really dark like chocolate
 - Does not smell bad
 - It is full of vitamins or nutrients that plants need to grow big. Just like us we need vitamins to grow big.



WORM CASTING HARVESTING

- Sifting Method:
 - Gently sift and hand pick worms
- Migration Method:
 - Worms follow food scrapes with time
 - Horizontally to one side in single level bins OR
 - Vertically with multiple trays
- Photosensitivity Method
 - Worms move away from light.
 - Introduce light to one area to get them to migrate
- Volcano Method
 - Make volcano shaped piles of compost
 - Worms will migrate to the bottom of piles



Application of Castings

- Now it is time to harvest the castings and give it to your plants. You can be generous when applying castings because you can not hurt plants with too much. Apply by:
 - Adding One to two inches on the surface with each planting (twice per year) Mixed into the top few inches of soil.
 - Adding a handful to bottom of hole when transplanting.
 - Using it in your seedling mix.
 - Add to house plants
 - Sift onto lawns
 - Brewed into Worm Tea
- Worm Leachate vs. Worm Tea
 - Leachate is the moisture that settles from food that is decomposing.
 - Tea is a brew of compost and water.



CLOSING and TRANSITION

- Now that we have learned all about worms...
Do you have any questions about worms?
- We are now going to go outside to 1) build your worm bin OR 2) explore a worm bin.

BUILDING THE SHELTER

Materials to be collected by the school:

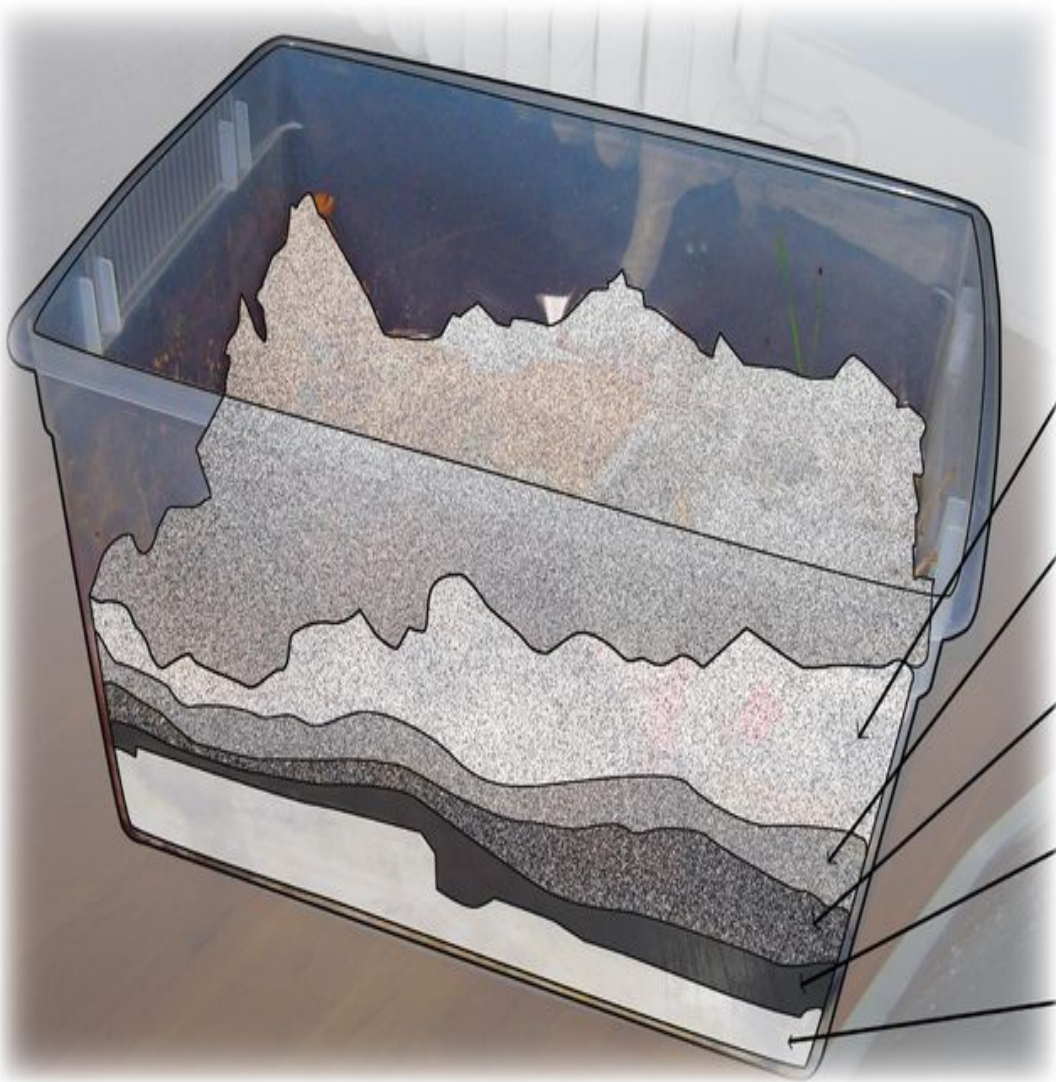
- 1-2 Newspapers or white recycled paper
- 5 gallon bucket of dead leaves
- 1 gallon of food scraps
- Already to go moist mixture of 1:1 Peatmoss/Coir and Organic Soil
- 1 pound of Worms

Materials for the Master Composter to bring:

- Spray bottle with water (1 gallon Weed Sprayer)

BUILDING THE SHELTER

- Shredded Paper Lining –
 - Show students the right way to shred newspaper. Raise your hand if you want to help shred paper? Note: All kids want to take a turn doing this... let them!
 - Ask Volunteers to spray water on the newspaper or use 5 gallon bucket filled with water to saturate the newspaper.
 - Ask for a volunteer to place the newspaper in the bottom of the bin.
- Organic Soil – Add soil, compost, and or peat moss/coir
 - Ask for volunteer help
- Worms
 - Ask students to gently add in the worms.
- Shredded Paper
 - Ask for Volunteer
- Food Scraps
 - Ask for volunteer
- Shredded Paper
 - Ask for volunteers to shred news paper to add to the top.



WORM BIN LAYERS

Shredded Paper

Food Scraps

Shredded Paper

Worms

Shredded Paper

ALTERNATIVE WORM SORT

Materials for Master Composter to bring:

- Harvesting Worms Additional Project materials:
 - Plastic table cloth
 - 5-10 Forks
 - 5-10 Paper Cups
- Mini 3 Bin Worm Shelter for sample and to carry worms.
 - Bottom is finished worm castings to pass around class
 - Top two bins are worms, FBI's, newspaper, and food

ALTERNATIVE WORM SORT

- Remind students to be very kind when finding worms.
 - Raise your hand if you know what it means to be kind?
- Add one small pile on a piece of newspaper in front of each student.
- Make small piles of compost and worms on pieces of newspaper or plastic table cloth.
- Give students forks and ask students to find worms and gently put them aside or in cups of soil.



WE ARE ALL DONE!!!

- Turn an give your friends a high five for doing such a good job building your worm bins/
Exploring
- Thank you so much for being such good listeners and such good worm owners!