

Appendix A: Worksheets

Worksheet Location in *The School Garden Curriculum*

Kindergarten

The Soil Ecosystem, Fall #6
Life in the Garden, Fall #7
The Parts of a Plant, Winter #5
Bee Guides, MS #9

First Grade

Can You Find These Edible Flowers?,
Fall #5
The Parts of a Seed, Winter #1
How Do Seeds Travel?, Winter #5

Second Grade

Predator and Prey Cards, Winter #1
The Parts of a Spider, Winter #3
Hummingbird Mask Template, Winter #5
Pollinators in the Garden, Spring #1
Butterfly and Moth Coloring Sheets,
Spring #2
Butterfly and Moth Guide, Spring #3
Citizen Scientist: Pollinator Monitoring,
Spring #6

Third Grade

Garden Exploration, Fall #1
Life in Our Garden's Soil, Fall #4
Insect Exploration, Fall #7
Decomposers, Consumers and
Producers, Fall #8–9
Garden Ecosystem Game, Fall #10
Soil Investigations, Winter #1
Potting Soil Recipe, Winter #3

Plant Growth Chart, Winter #4
The Soil Spectrum, Winter #5

Fourth Grade

Garden Scavenger Hunt, Fall #1
Meet an Earthworm, Fall #6
External Worm Anatomy, Fall #7
Internal Worm Anatomy, Fall #8
Mini Worm Bin Experiments, Winter #2–3
What Worms Eat, Winter #4
Recipe for a Worm Bin, Spring #1
Cafeteria Waste Audit, Spring #2
Worm Bin Assessment, Spring #3
The Worm Bin Community, Spring #3
Worms in Our Soil, Spring #5

Fifth Grade

Garden Discovery, Fall #1
Where Does This Go?, Fall #7
What Does Decomposition Look Like?,
Fall #8–9
Decomposition Timeline, Winter #1
Compost in a Jar, Winter #2
Aerobic and Anaerobic, Winter #5
Creatures in Our Compost, Spring #2
Discovering Microorganisms, Spring #3

Sixth Grade

Welcome to the Garden, Fall #1
The Way Water Moves, Fall #6
The Water Catchment Race, Fall #8
The Eight Rainwater Harvesting Principles

Name: _____

**The Soil Ecosystem
(with older partner help)**

| What We Saw (draw with detail) | This is a... |
|--------------------------------|--------------|
| | |
| | |
| | |

| What We Saw (draw with detail) | This is a... |
|--------------------------------|--------------|
| | |
| | |

Questions and wonderings I have about these creatures:
(with older partner help)


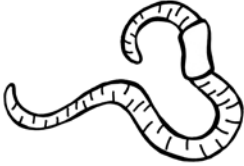


I wonder...

1. _____

2. _____

Name: _____

Life in the Garden

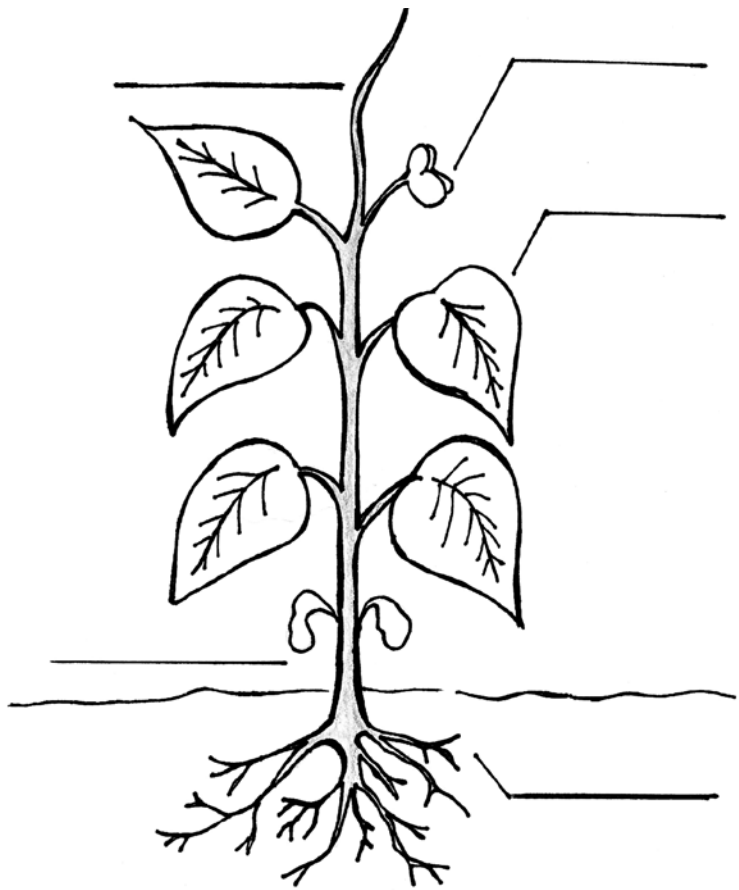
| Creature We Found | How many # |
|------------------------------------------------------------------------------------------------------|------------|
| <p>Sow Bug</p>  | |
| <p>Earthworm</p>  | |
| <p>Slug</p>  | |
| <p>Centipede</p>  | |

I wonder _____

Name: _____

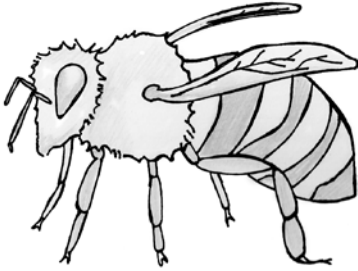
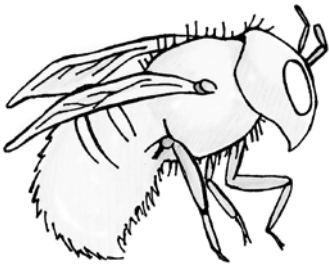
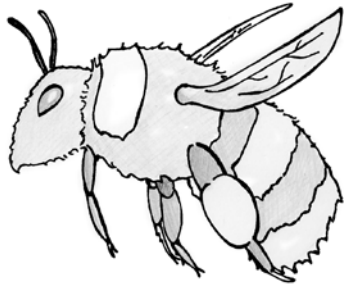
The Parts of a Plant

This is a _____ plant.




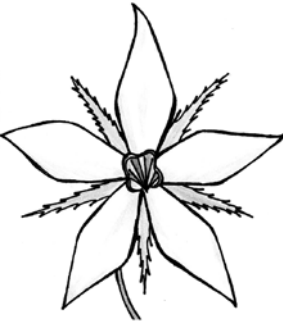

Name: _____

Bee Guides


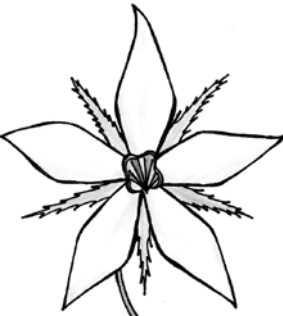

| Creature We Found | How many did you see? |
|-------------------------------------------------------------------------------------------------------|-----------------------|
| <p>Honey Bee</p>  | |
| <p>Mason Bee</p>  | |
| <p>Bumble Bee</p>  | |

Name: _____


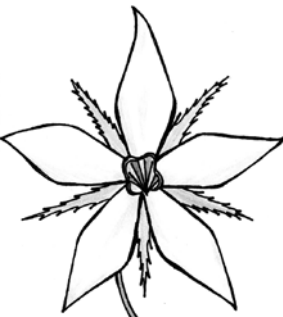

Can You Find These Edible Flowers?

| Nasturtium | Borage | Calendula |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |

Can You Find These Edible Flowers?

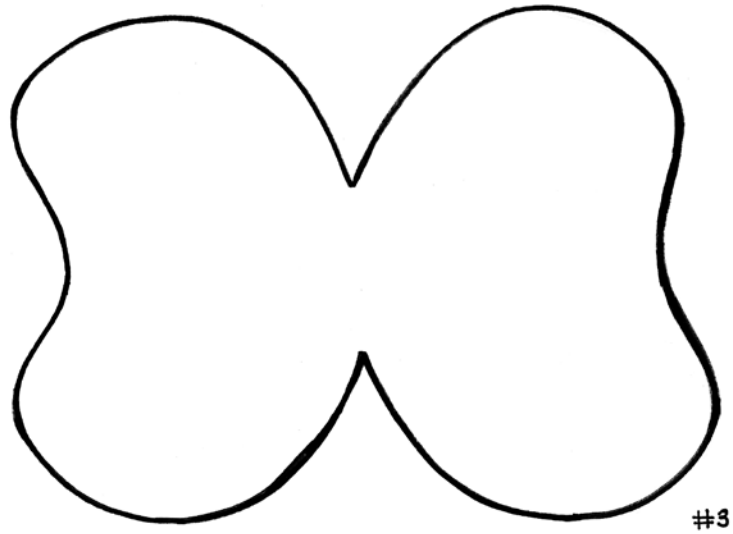
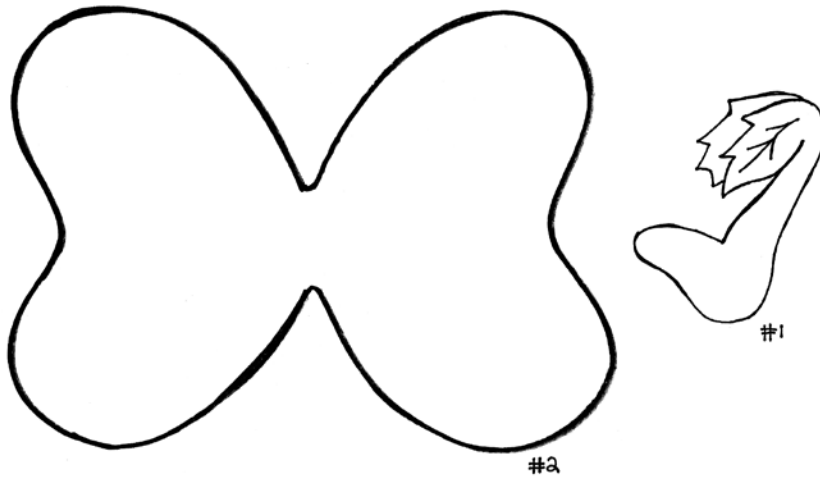
| Nasturtium | Borage | Calendula |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |  |

Can You Find These Edible Flowers?

| Nasturtium | Borage | Calendula |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |

Name: _____

The Parts of a Seed



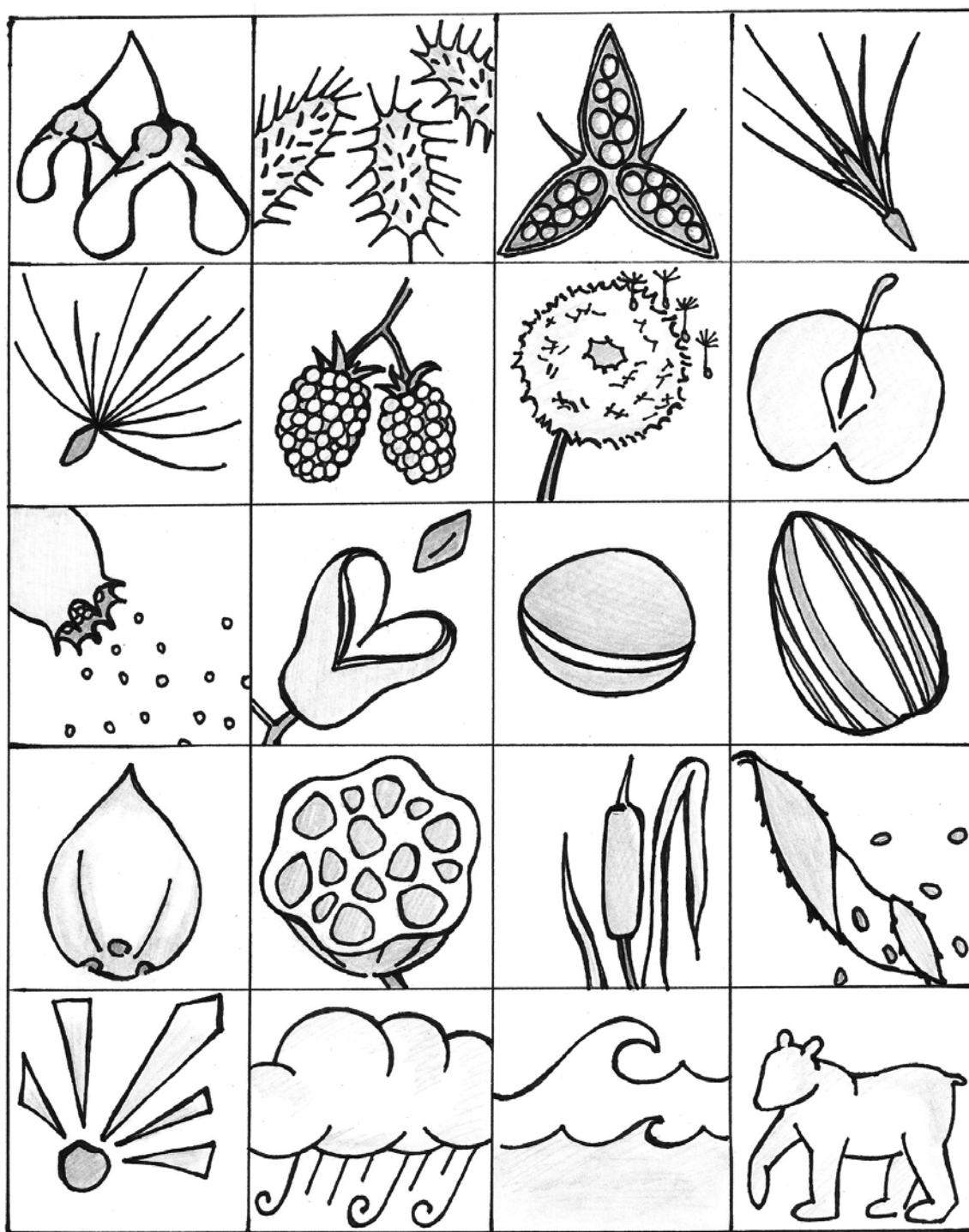
Name: _____

How Do Seeds Travel?

Directions: Cut out each seed square on the sheet provided and assemble the images under the way the seed travels in the columns below.

| By Wind | By Animals | By Water | By Bursting |
|---------|------------|----------|-------------|
| | | | |

How Do Seeds Travel?



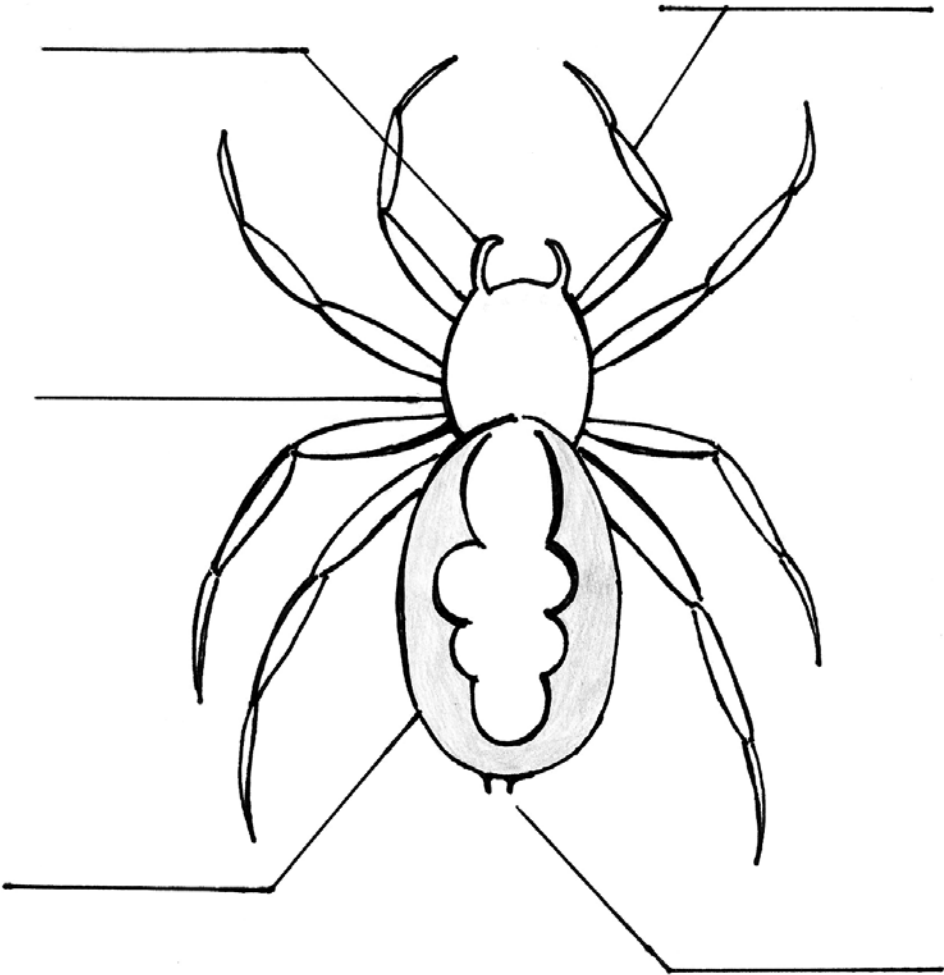
Name: _____

Predator and Prey

| | | | | |
|-----------|----------|----------------|------------|---------------|
| Ladybug | Honeybee | Mouse | Ant | Yellow Jacket |
| Butterfly | Aphid | Coyote | Snail | Garden Spider |
| Moth | Falcon | Praying Mantis | Salamander | Robin |
| Mosquito | Bat | Beetle | Centipede | Mole |
| Frog | Swallow | Grasshopper | Earthworm | Slug |

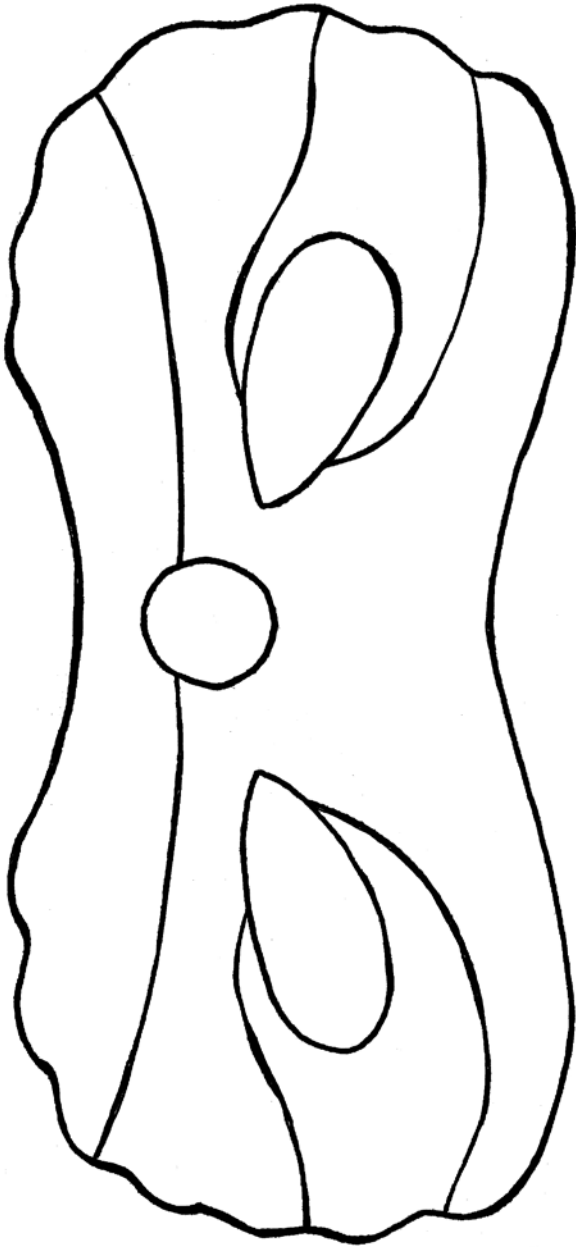
Name: _____

The Parts of a Spider



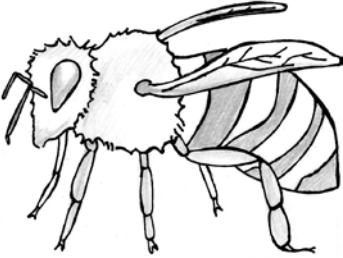
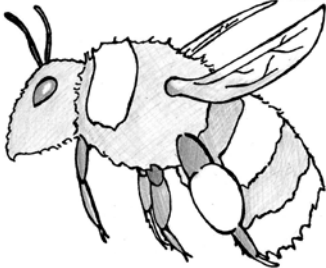
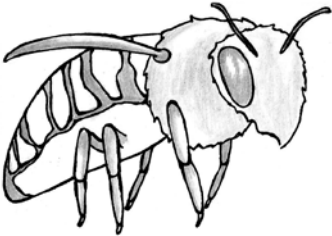
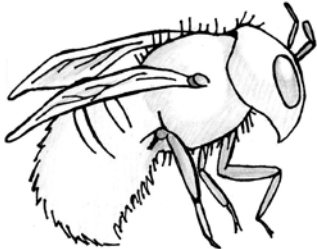
Name: _____

Hummingbird Mask Template



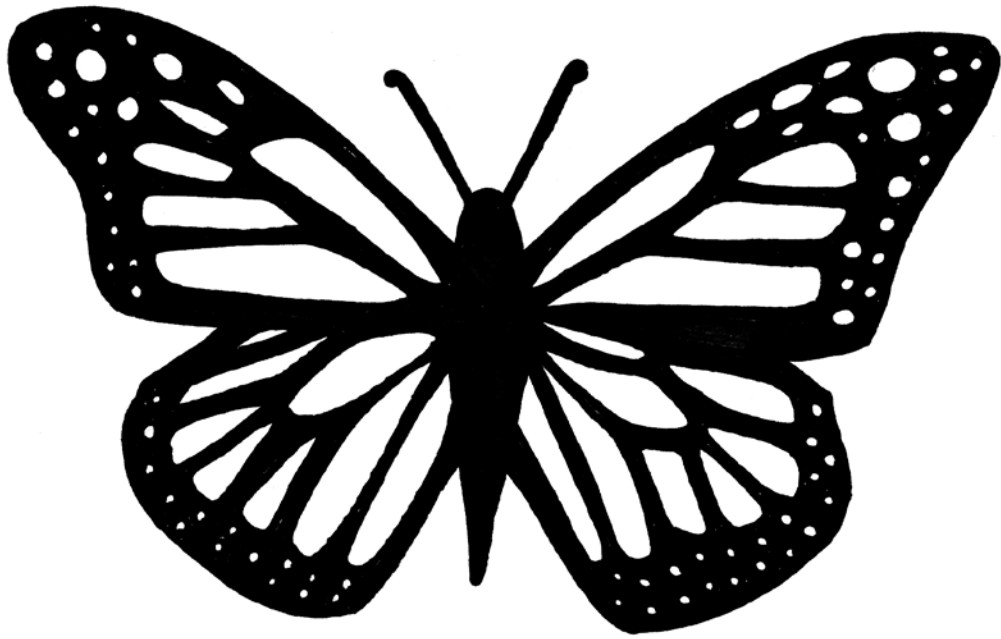
Name: _____

Pollinators in the Garden

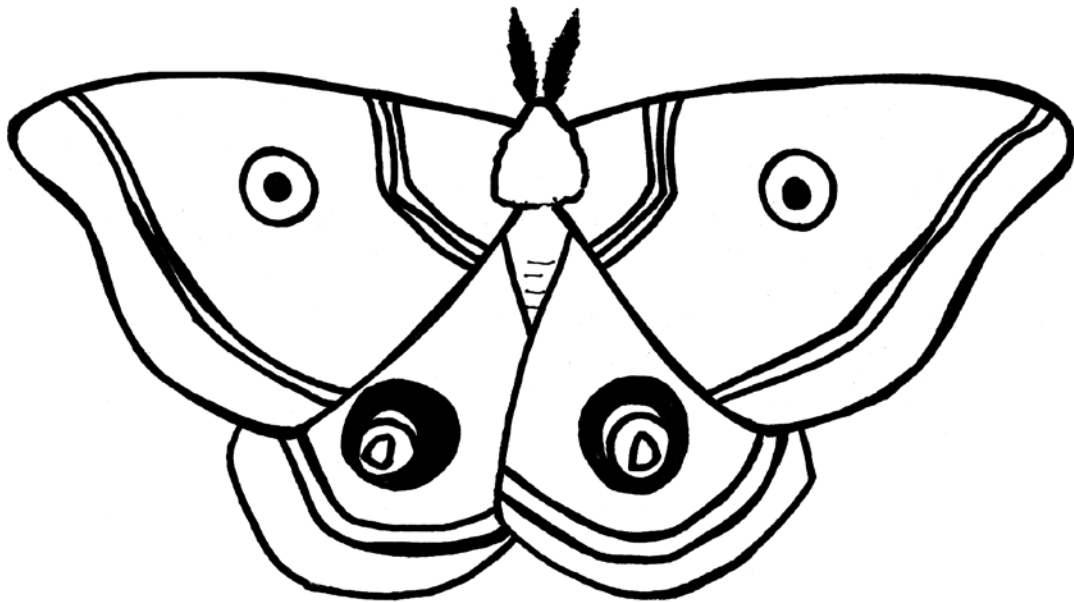
| | |
|---------------------------------------------------------------------------------------------------------------|------------------------|
| <div>Honey Bee</div>  | Flower Colors Visited: |
| | Red |
| <div>Bumblebee</div>  | Orange |
| | Yellow |
| <div>Leafcutter Bee</div>  | Blue |
| | Pink |
| <div>Mason Bee</div>  | Purple |
| | White |

Name: _____

Butterfly and Moth Coloring Sheets



Monarch
Butterfly



Polyphemus
Moth

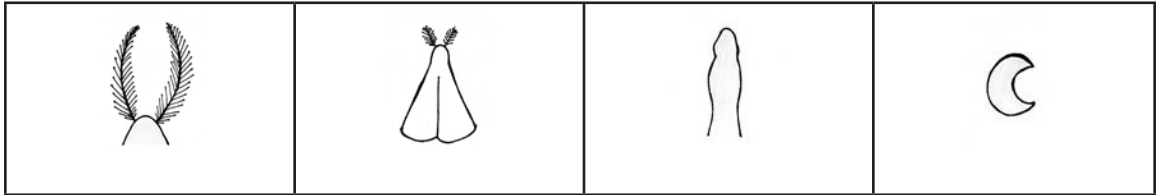
Name: _____

Butterfly and Moth Guide

Butterflies have these features:



Moths have these features:



Butterfly Example

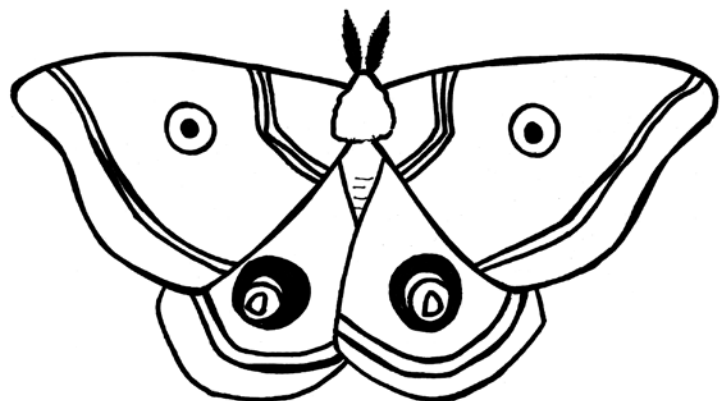
How many I found:



Monarch
Butterfly

Moth Example

How many I found:



Polyphemus
Moth

Name: _____

Citizen Scientists: Pollinator Monitoring

Observer Name: _____

Site: _____

Date: _____

Weather: _____

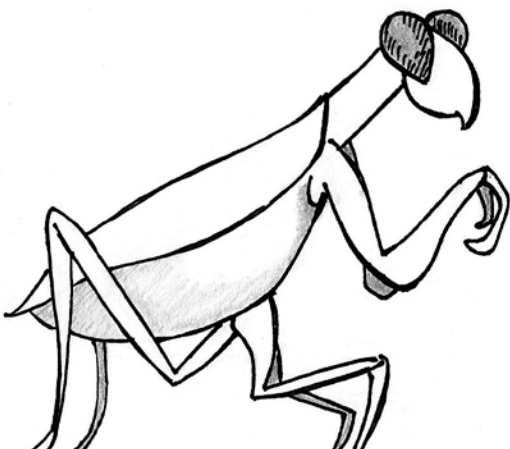
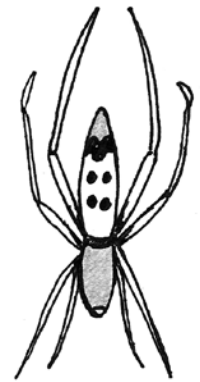
Temperature: _____

Pollinator Group: _____

| Observations | | |
|--------------|--------------------|--------------|
| Flower Color | Number of Visitors | Total Number |
| | | |
| | | |
| | | |
| | | |
| | | |



Becoming Soil Scientists



Name: _____

Garden Exploration

Where can you find fungi in the garden? What kind of fungi did you find?

Find and name one plant in the garden whose roots are edible.

Find evidence of a leaf that has been chewed by an insect. What kind of leaf is it?

Where can you find sandy soil in the garden?

Find and name one insect that is a predator of other insects.

What is the name of the insect that ladybugs like to eat?

What kind of soil is too compact to grow plants in? Where can you find it in the garden?

Where can you find a place in the garden where humans make soil?

Name: _____

Life in Our Garden’s Soil

Directions: Explore the entire length of the garden and observe as many nonliving and living things that you can. Don’t rush! Take your time and make quality observations. List the living and nonliving items in the columns below.

How do you know if it is alive?

___ Is it feeding?

___ Is it breathing?

___ Is it growing?

___ Is it pooping?

___ Is it moving?

___ Is it reproducing?

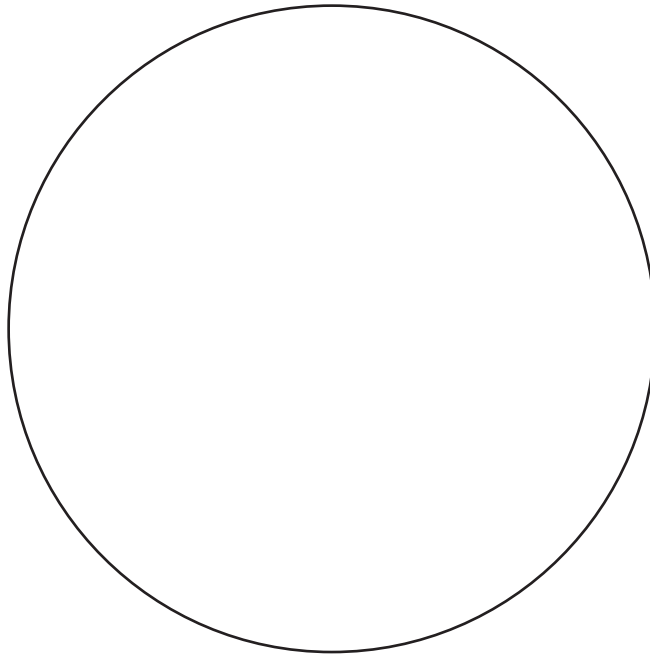
| Living | Nonliving |
|--------|-----------|
| | |

Name: _____

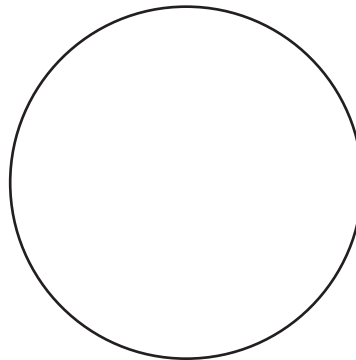
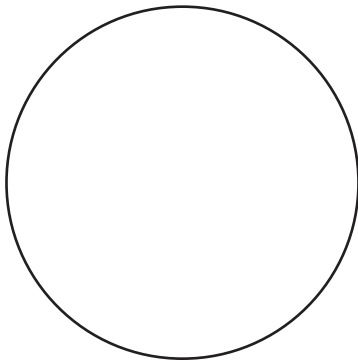
Insect Exploration

1. Draw a portrait of one of the insects in your trap in the circle. Use as much detail as possible (legs, antennae, eyes, segments).

2. What behaviors do you see this insect showing? _____



Draw portraits of two more insects from your trap in the other two circles.



Name: _____

Decomposers, Consumers, and Producers

To the best of your ability, name and draw a decomposer, a producer, and a consumer from our garden in the spaces below. **Pay special attention to detail.**

How do you know if it is alive?

___ Is it feeding?

___ Is it breathing?

___ Is it growing?

___ Is it pooping?

___ Is it moving?

___ Is it reproducing?

| Decomposers |
|-------------|
| |

| |
|-----------|
| Consumers |
|-----------|

| Producers |
|-----------|
| |

Write a short poem about the daily life of one of these living things. What does it encounter and do in a day? Use any style of poem you like.

[illegible]

Name: _____

Garden Ecosystem Game: Clues and Answers

1. I am small and have six legs and a red spotted body. What am I?
Answer: A ladybug.
2. I am tiny and colored green or black. Ladybugs like to eat me. What am I?
Answer: An aphid.
3. Aphids climb on my stems and leaves and suck the juice out of me. What am I?
Answer: A plant.
4. A plant grows fruits, stems, leaves, seeds, and flowers for me to eat. What two-legged animal am I?
Answer: A human.
5. When the days are warm and the soil is dry, a human may use a hose to sprinkle me over the garden. What liquid am I?
Answer: Water.
6. I am an animal who loves to take baths in water outside. I fly from tree to tree. What am I?
Answer: A bird.
7. A bird loves to eat me. I am small and hard, but when I grow I can get very big. What am I?
Answer: A sunflower.
8. A sunflower seed grows up to provide food for animals. What does a sunflower seed grow into?
Answer: A sunflower plant.
9. The sunflower needs me. In the summer, I provide warmth and light. I help plants grow and make the leaves green. What am I?
Answer: The sun.
10. The sun keeps me warm. I hunt for food in the garden, but I do not eat vegetables. I am a reptile. What am I?
Answer: A snake.
11. A snake is my predator, and I am his prey. I am small and grey and run very quickly. What am I?
Answer: A mouse.
12. Mice hide from me. I make my nest in high places overlooking open spaces. I have sharp eyes and can see mice from very far away. What am I?
Answer: A hawk.
13. The hawk nests in me. I am tall, I have deep roots, and I sway in the wind. What am I?
Answer: A tree.

14. A tree is the place for me. I love to climb up and down and all around. The tree provides me with food and shelter. I have a big bushy tail. What am I?
Answer: A squirrel.
15. Squirrels eat me. Plants produce me to make another plant. I remain dormant during the cold winter months. What am I?
Answer: A seed.
16. Seeds grow in me. As a whole, I am not alive but filled with living and nonliving things. What am I?
Answer: The soil.
17. I live in the soil. I am long and wriggle through the garden making tunnels. I help plants decompose. What am I?
Answer: An earthworm.
18. The worm burrows bring oxygen down to me. I make a strong base for my stems. I absorb water and nutrients from the soil. What part of a plant am I?
Answer: A root.
19. I have long mycelium roots that hold me up from the ground. I feed many creatures and feed on many more. I especially love the roots around trees. What am I?
Answer: Fungi.
20. I am a tiny creature that loves to eat tiny root fungi. What am I?
Answer: A nematode.
21. I am a predator who loves to munch on nutrient-rich nematodes. What am I?
Answer: An arthropod.
22. I am blind, but I still hunt down tasty arthropods in my long tunnels. My big hands help me dig after them. What am I?
Answer: A mole.
23. I like to hide in mole burrows during the hot summer days. But at night I come out and munch on all the tasty green leaves I can find, or even the dead ones. What am I?
Answer: A slug.
24. Slugs enjoy eating the food I grow in my soil. Humans plant seeds throughout me, growing carrots and tasty foods. The energy from the sun comes to warm me up. What ecosystem am I?
Answer: A school garden.

| | | |
|---------------|-----------------|---------|
| Sun | Aphid | Mouse |
| School Garden | Slug | Seed |
| Earthworm | Bird | Roots |
| Tree | Fungi | Water |
| Snake | Mole | Ladybug |
| Plant | Sunflower Seed | Soil |
| Squirrel | Arthropod | Hawk |
| Nematode | Sunflower Plant | Human |

Name: _____

Soil Investigations

Where is your soil from? _____

What was growing near it? _____

What colors are in it? _____

How does it smell? _____

How does it feel? _____

Name: _____

Soil Investigations

Where is your soil from? _____

What was growing near it? _____

What colors are in it? _____

How does it smell? _____

How does it feel? _____

Names: _____

Potting Soil Recipe

| Materials | Quatity | Particle Size |
|-----------|---------|---------------|
| | | |
| | | |
| | | |
| | | |
| | | |

Names: _____

Potting Soil Recipe

| Materials | Quatity | Particle Size |
|-----------|---------|---------------|
| | | |
| | | |
| | | |
| | | |
| | | |

Names: _____

Plant Growth Chart

| | Plant Varieties | | |
|-----------------------------------------------------------|-----------------|----|----|
| | 1. | 2. | 3. |
| Week 1 Planted on (date): | | | |
| Observations | | | |
| Week 2 Observations | | | |
| Size/height (cm or in) | | | |
| Week 3 Observations | | | |
| Size/height (cm or in) | | | |
| Week 4 Observations | | | |
| Size/height (cm or in) | | | |
| pH: Nitrogen (N): Phosphorus (P): Potassium (K): | | | |
| Week 5 Observations | | | |
| Size/height (cm or in) | | | |
| Week 6 Observations | | | |
| Size/height (cm or in) | | | |
| | | | |

What plant starts were the most successful? _____

What variables did you encounter during the experiment? _____

What would you do differently in the future? _____

Name: _____

The Soil Spectrum

- A** Organic Matter
- B** Iron
- C** Large amount of iron
- D** Water-logged, acidic
- E** Calcium
- F** Manganese, sulfur, and nitrogen
- G** Other:
- H** Other:
- I** Other:

Soil #1

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

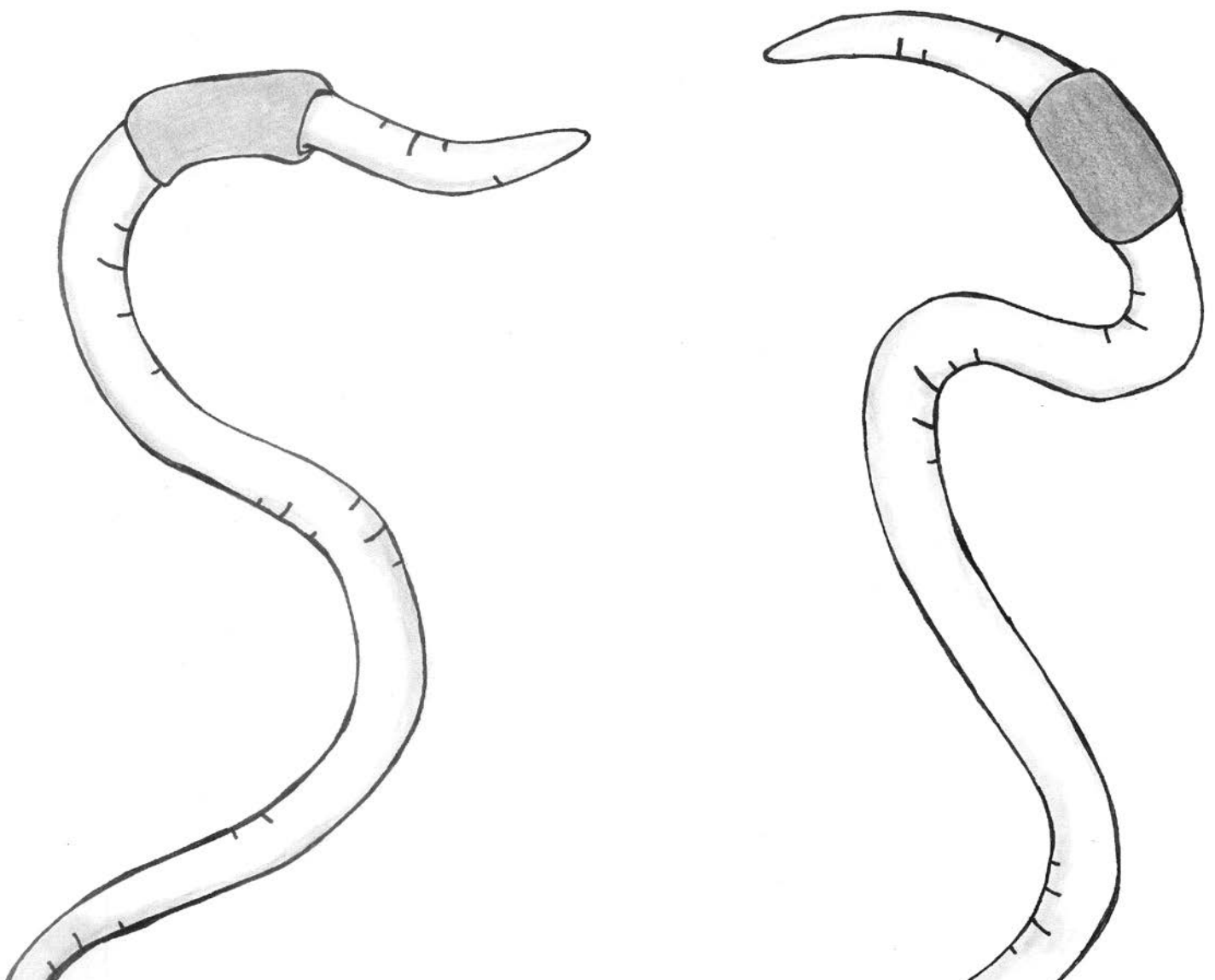
Soil #2

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Soil #3

| | | | | |
|--|--|--|--|--|
| | | | | |
|--|--|--|--|--|

Vermicomposting



Name: _____

Garden Scavenger Hunt

How many _____ can you find in the garden? _____

Using your body, do your best to measure the height of the nearest sunflower.

How many steps does it take to walk from one end of the garden to the other?

Find and name one edible flower in the garden. _____

Name 3 ingredients used in mulching:

1. _____

2. _____

3. _____

Count 10 of the same living thing in the garden. What did you count? Be specific.

Turn over a log or stone in the garden. Find and identify four different living things:

1. _____

2. _____

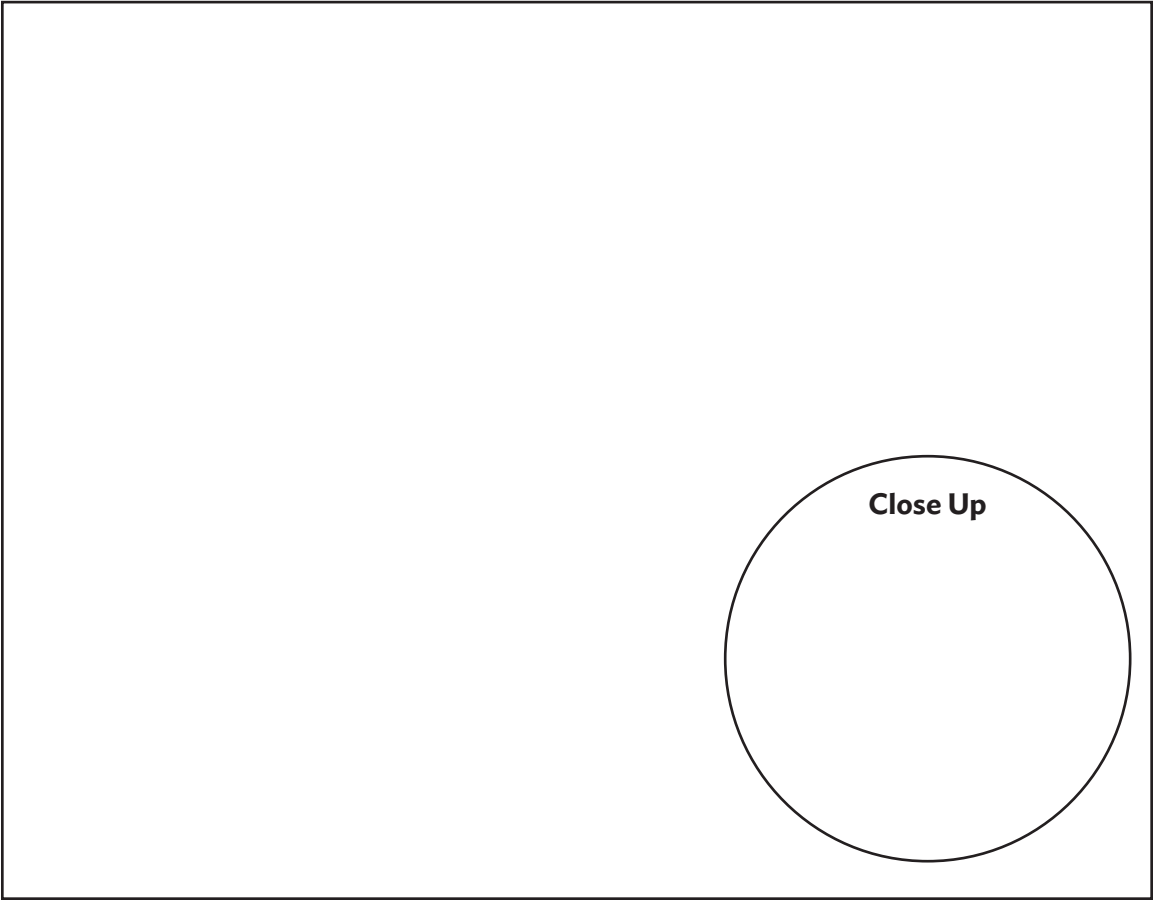
3. _____

4. _____

Name: _____

Meet an Earthworm

Below is a picture of what I saw:



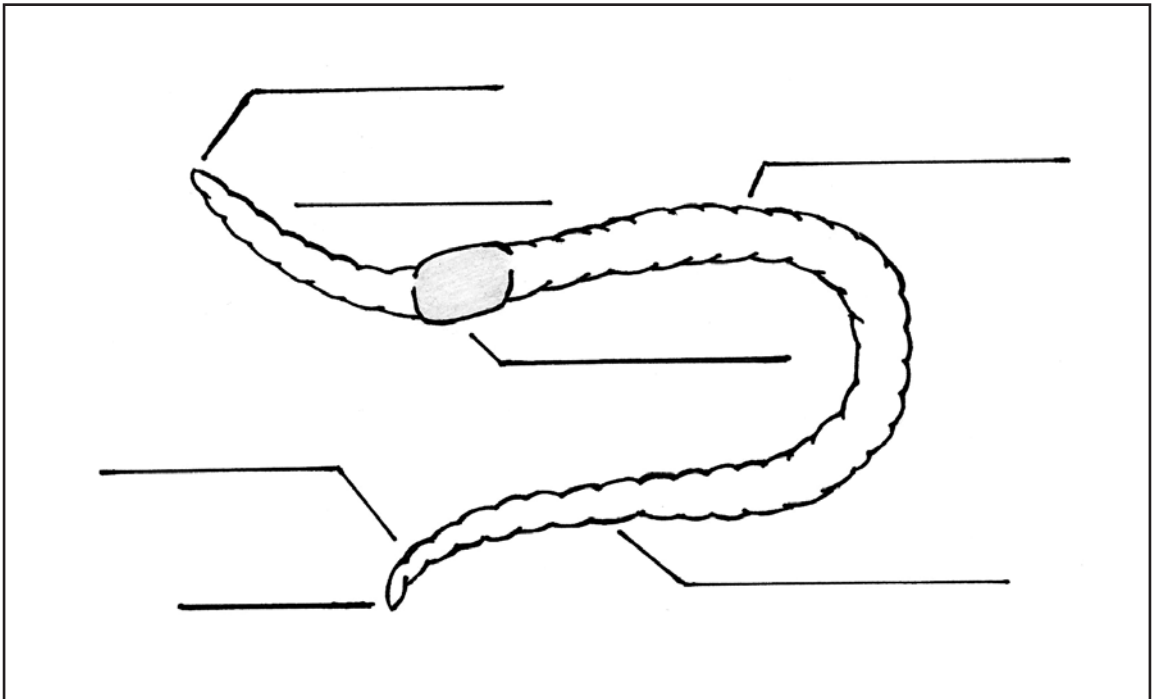
One thing I don't know about this worm is: _____

Name: _____

External Worm Anatomy

Step 1. Identify the parts of a worm from your sample.

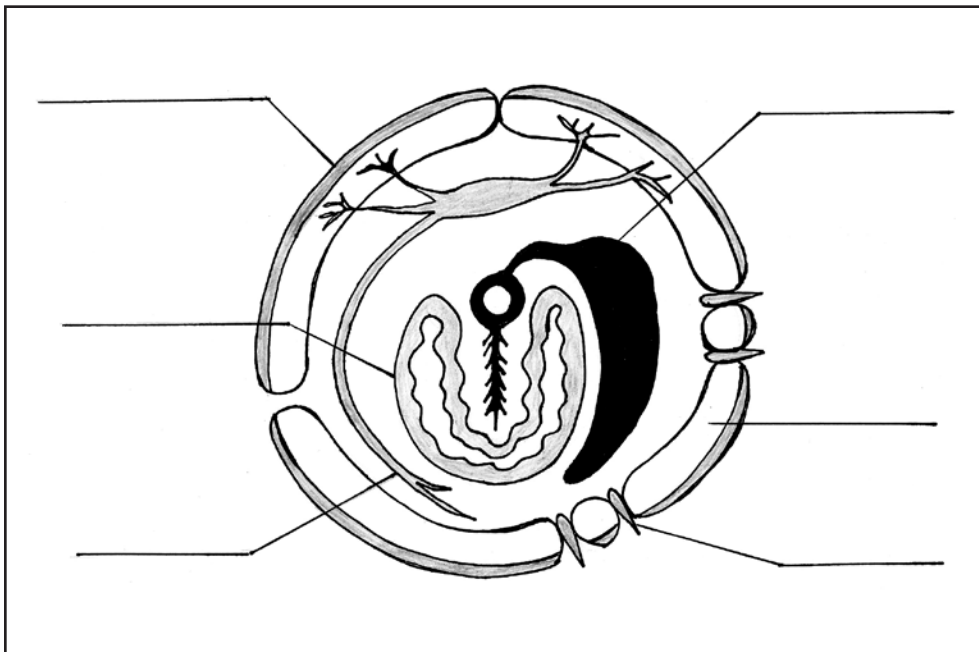
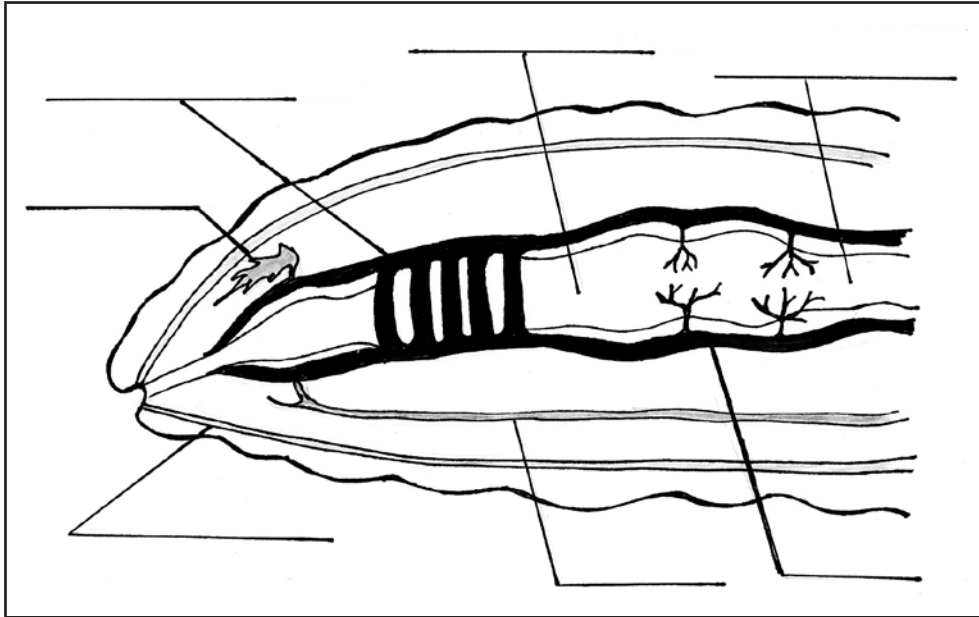
Step 2. Label these parts on the picture below in the correct spot.



Is your worm an adult? How can you tell? _____

Name: _____

Internal Worm Anatomy



Name: _____

Mini Worm Bin Experiments

Part 1: Assembling

1. Assemble your mini worm bin, as instructed:
2. Cut off the top of your bottle where it starts to bend. Practice safety!
3. Carefully put 6 inches of soil in the bottom of your container.
4. Go out to the compost and gather food for your worms.
5. Cover the worms with one inch of newspaper and spray the newspaper with water until it is fully moist.
6. Put plastic wrap over the container opening, securing it with a rubber band. Carefully poke holes into the top.

Part 2

Draw what you see below, recording as much detail as possible.



Part 3: Checking In

- ☐ Are your worms moving (active)?
- ☐ Are they eating their food?
- ☐ Is the soil moist?
- ☐ Is it dark enough for your worms?
- ☐ Does the worm bin smell healthy?
- ☐ Is there enough food for your worm?

Experiment #1: How Do Worms See Light?

Prediction (circle one)

I think worms like: bright light darkness partial light

Or, I think worms will _____

Design

Construct an experiment to test your prediction using the materials you have on hand.

What Happened During Your Experiment?

Describe the behavior of your worm when exposed to:

| Light | Partial Light/Dark | Darkness |
|-------|--------------------|----------|
| | | |

Conclusions

Was your prediction correct? Yes No

What does this tell you about how worms sense light? _____

Extra

How fast do worms travel? _____

Directions

Using a stopwatch, record how long it takes a worm to travel one foot (12 inches) with light, without light, and in partial light/dark.

Results (in minutes or seconds)

| Light | Partial Light/Dark | Darkness |
|-------|--------------------|----------|
| | | |

Experiment #2: How Do Worms Smell?

Design

Using three different food samples from the garden, design an experiment to test which food your worm prefers.

Prediction

Which substance do you think the worms will prefer and why? _____

Test

| Substance | Worm #1 | Worm #2 |
|-----------|---------|---------|
| Item 1 | | |
| Item 2 | | |
| Item 3 | | |

Conclusions

Was your prediction correct? Yes No

What item did your worms prefer? _____

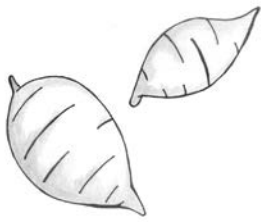
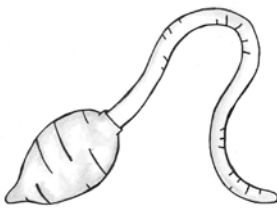
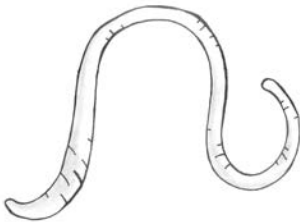
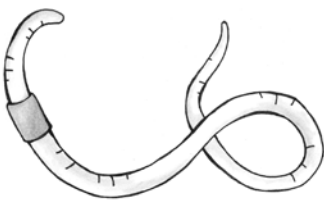
What body parts did they smell it? _____

List what behaviors you noticed: _____

Experiment #3: The Life Cycle of a Worm

Directions:

1. Carefully pour your worm bin on a place mat.
2. Using a pencil or wooden stick, explore the contents of your bin, searching for the following worm life stages.
3. Keep a tally of your findings below:

| | |
|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;">Cocoon</p>  | <p>How many do you see? _____</p> <p>What do they look like? _____</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| <p style="text-align: center;">Young Hatchling</p>  | <p>How many do you see? _____</p> <p>What do they look like? _____</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| <p style="text-align: center;">Immature Adults</p>  | <p>How many do you see? _____</p> <p>What do they look like? _____</p> <p>_____</p> <p>_____</p> <p>_____</p> |
| <p style="text-align: center;">Mature Adults</p>  | <p>How many do you see? _____</p> <p>What do they look like? _____</p> <p>_____</p> <p>_____</p> <p>_____</p> |

Experiment #4: What Soils Do Worms Prefer?

Hypothesis: _____

Design

- 1. Gather four soil samples for your experiment.
- 2. Using the provided materials, design an experiment that will test which type of soil your worms will prefer.

| | |
|---------------------------------------------------------------|---------------------------------------------------------------|
| Soil Sample #1: _____ | Soil Sample #2: _____ |
| Soil Sample #3: _____ | Soil Sample #4: _____ |

Conclusions

Was your hypothesis correct? Yes No

What soil did your worms seek out? _____

What behavior did they show to indicate this to you? Describe in detail. _____

Questions

Come up with two questions about worms and this experiment:

- 1. _____

- 2. _____

Name: _____

What Worms Eat

| | |
|----------------|------------------|
| Apples | Cucumber |
| Lemon | Chicken Bones |
| Banana Peels | Oatmeal |
| Pizza Crust | Oranges |
| Tea Leaves | Pumpkin |
| Egg Shells | Coffee Grounds |
| Tomatoes | Grapefruit Peels |
| Pancakes | Garlic |
| Cheese | Watermelon Rinds |
| Cake | Cream Cheese |
| Onion Peel | Potato Chips |
| Pineapple Rind | Olive Oil |

Name: _____

Recipe for a Worm Bin

Ingredients

1. A container: Wooden or plastic box, composting container, or _____

2. Bedding: Peat, coconut fiber, or _____

3. Grit: Fine ground gravel or _____

4. Compost (There are more players in the decomposition game than just worms!)
5. Water (The soil should feel like a wrung-out sponge.)
6. Food scraps: _____

7. Worms: Not all worms like to live in worm bins. For our school worm bins, we use _____

Worm Fact: Some people believe that worms enjoy eating raw plant matter, but worms' mouths aren't strong enough to feed on hard surfaces like fresh apple slices. Instead, they wait for microbes to feed on the food, letting it decompose and begin to get moldy and mushy before taking nice slurps of gooey, delicious, composting soup!

Name: _____

Cafeteria Waste Audit

Week # _____

1. Daily lunch compost weight: _____ lbs and _____ ounces.
2. Types of food in the compost bin: _____

3. What foods should worms not eat that are in the compost bin? _____

Week # _____

1. Daily lunch compost weight: _____ lbs and _____ ounces.
2. Types of food in the compost bin: _____

3. What foods should worms not eat that are in the compost bin? _____

Week # _____

1. Daily lunch compost weight: _____ lbs and _____ ounces.
2. Types of food in the compost bin: _____

3. What foods should worms not eat that are in the compost bin? _____

Name: _____

Date: _____

Worm Bin Assessment

1. Look for worms moving away into the dark part of the bin, insects and other creatures, food, and bedding.

Is the food breaking down? _____

Describe the smell: _____

2. Water: Is everything moist enough?

How can you tell? _____

3. Soil: Is there grit for digestion? _____

4. Food: Is there too much or too little food? _____

Are the worms feeding on something that seems delicious to them? If so, what is it? _____

5. Bedding: Does it seem dry along the edges of the bin? _____

6. What has changed since the last time you checked these bins? _____

Name: _____

Worm Bin Community

Guiding Question: What creatures cohabit in our worm bins, and what do their populations say about the health of the bin?

Materials

____ Place mat ____ Toothpick ____ Worksheet ____ Vermicompost

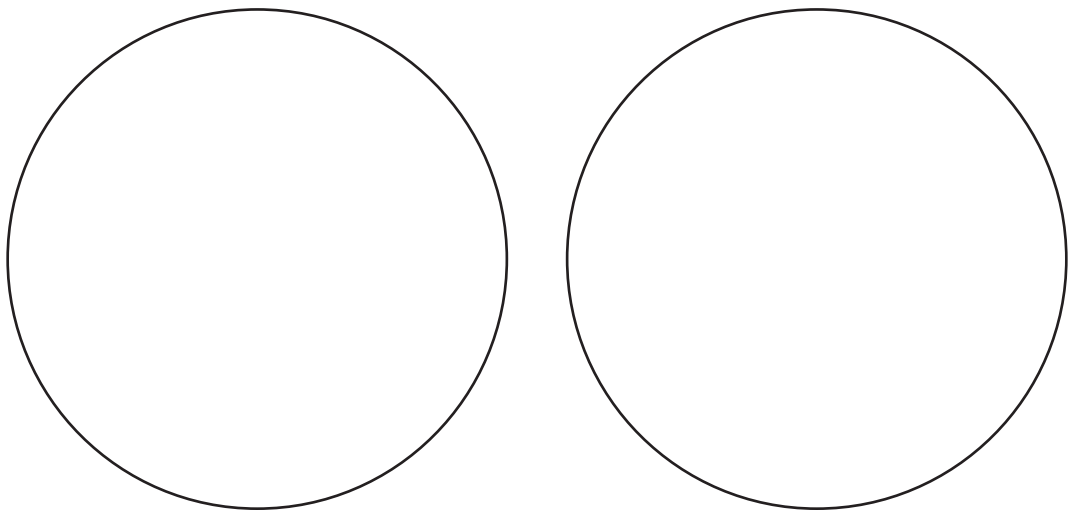
Directions

1. Measure two cups of soil from one of the worm bins and carefully pour it onto a placemat.
2. Using a toothpick, explore the soil sample and keep a close eye on any living creatures.
3. Record your findings below:

The diagram consists of six empty rounded rectangular boxes arranged in a cross shape. One box is at the top, one is at the bottom, one is on the left, one is on the right, and one is in the center. These boxes are intended for students to record their findings from the worm bin exploration.

I also saw these other creatures: _____

Closeups



What do our findings tell us about the health of our worm bins? _____

Name: _____

Date: _____

Worms in Our Soil

Epigeic worms such as the common red wiggler live on the surface of the earth and eat rotting organic matter. They have a high rate of reproduction and are small, reddish brown and striped. They tend to be 2 to 5 inches long.

How many did you see? _____

What life stages did you observe? _____

Endogeic worms build lateral burrows and are the only worms that eat large quantities of soil. They have little effect on surface litter, but prefer decomposing dead plant roots. These earthworms are often pale colors, such as grey, pale pink, green, or blue and can be 4 to 12 inches long.

How many did you see? _____

What life stages did you observe? _____

Anecic worms (also known as nightcrawlers) come to the surface at night to drag leaves and other organic matter into their deep and permanent vertical burrows. Anecic worms play a central role in the decomposition of leaf litter and soil formation. They tend to be 4 to 12 inches and are pink to dark red.

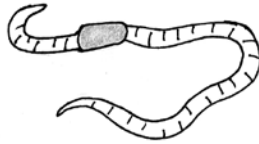
How many did you see? _____

What life stages did you observe? _____

Information gathered from "Niches Within Earthworms' Habitat." Science Learning Hub. Web.



Discovering Composting



Name: _____

Garden Discovery

Find and name:

An edible flower. Check with an adult, pick, and describe its taste.

A plant that has seeds that fly away _____

A red and green leaf _____

One of the plants growing in a raised bed _____

One edible weed _____

What is the largest leaf in the garden? _____

One animal that lives under our garden? _____

Do you know:

What plant in the garden is climbing another one? _____

Where to find an insect larvae or caterpillar? _____

A plant that has been chewed by an insect? _____

Where is your favorite place in the garden? _____

How does it make you feel? Why do you like it? _____

Bonus question: What part of a plant is a vegetable? _____

Name: _____

Where Does This Go?

Directions

1. Cut each section out.
2. Place it in the column on the next page that best fits where the item goes when it is considered waste.
3. **Do not glue.**

| | |
|------------------------------------------------|-------------------------------|
| Leaves | Nut shells |
| Plants | Shredded paper |
| Straw and hay | Manure |
| Diseased plants | Plastic |
| Yard trimmings treated with chemical pesticide | Branches or limbs |
| Fruits, vegetables, and grains | Dead flowers |
| Eggshells | Dairy products (milk, cheese) |
| Coffee grounds | Bones |
| Sawdust | Meats |
| Dryer lint | Invasive weeds |
| Egg cartons | Pesticides |
| Pet poop | Compostable corn cups |
| Grass | Newspaper |
| Tea bags | |

| | |
|--------------------|--|
| School Compost | |
| Landfill | |
| Industrial Compost | |
| Recycling | |

Name: _____

What Does Decomposition Look Like?

“De” means “reverse”

“Compose” means “to put together”

Reverse + To Put Together = To Take Something Apart

Directions

1. Draw or list every item you can identify in each compost sample.
2. Label it as living, brown, or green material.

Bin 1

Living: _____

Brown Material: _____

Green Material: _____

Bin 2

Living: _____

Brown Material: _____

Green Material: _____

Bin 3

Living: _____

Brown Material: _____

Green Material: _____

Name: _____

Decomposition Timeline

Directions

1. In pencil, draw a line from each material to how long you believe it will take to decompose.
2. As a class, check over your answers and correct on your sheet as needed.

| Material | Decomposition Time (up to) |
|----------------------------|----------------------------|
| Glass Bottle | 450 years |
| Paper Towel | 6 weeks |
| Apple Core | 5 years |
| Leather | 5 years |
| Plastic Coated Milk Carton | 500 years + |
| Plastic Bottle | 100 years |
| Aluminum Can | 1 million years |
| Newspaper | 100 years |
| Orange Peel | 500 years + |
| Disposable Diapers | 5 years |
| Monofilament Fishing Line | 450 years |
| Wool Sock | 4 months |
| Rubber Boots | 1 million years |
| Plastic Bag | 6 months |
| Styrofoam Cup | 50 years |
| Tin Can | 80 years |
| Cigarette Butts | 600 years |
| Plastic Jug | 2 months |

Decomposition Timeline Cheat Sheet

| Material | Decomposition Time (up to) |
|----------------------------|----------------------------|
| Glass Bottle | 1 million years |
| Paper Towel | 4 months |
| Apple Core | 2 months |
| Leather | 50 years |
| Plastic Coated Milk Carton | 5 years |
| Plastic Bottle | 450 years |
| Aluminum Can | 100 years |
| Newspaper | 6 weeks |
| Orange Peel | 6 months |
| Disposable Diapers | 450 years |
| Monofilament Fishing Line | 600 years |
| Wool Sock | 5 years |
| Rubber Boots | 80 years |
| Plastic Bag | 500 years + |
| Styrofoam Cup | 500 years + |
| Tin Can | 100 years |
| Cigarette Butts | 5 years |
| Plastic Jug | 1 million years |

Note: There is much more data on decomposition rates of marine debris than on landfill waste. This variance is an opportunity to discuss how various environments affect material break-down differently through decomposition, biodegradation, photodegradation, and corrosion.

Sources:

“Measuring Biodegradability.” Science Learning Hub.

<https://www.sciencelearn.org.nz/resources/1543-measuring-biodegradability>

“Marine debris is everyone’s problem.” Marine Debris Decomposition Times. Coastal Cleanups. New Hampshire Department of Environmental Services.

<https://www.whoi.edu/fileserver.do?id=107364&pt=2&p=88817>

Name: _____

Compost in a Jar

Guiding Question

Hypotheses

Gathering Materials and Building the Project Materials We Need

Measuring Decomposition

1. Observe the smell, moisture level, and decomposer/ecosystem activity in your bin.
2. Measure and record the size of your material.
3. Describe in detail the physical changes your item is undergoing.
4. To the best of your ability, estimate the decomposition of your item compared to its original state (100% is still fully formed). Record this estimate in the Charting Decomposition Graph below.

Remember: the ratio of brown to green materials is 3:1!

Charting Decomposition

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|------|--------|--------|--------|--------|--------|
| 100% | | | | | |
| 95% | | | | | |
| 85% | | | | | |
| 75% | | | | | |
| 65% | | | | | |
| 55% | | | | | |
| 50% | | | | | |
| 45% | | | | | |
| 35% | | | | | |
| 25% | | | | | |
| 15% | | | | | |
| 5% | | | | | |
| 0% | | | | | |

Weekly Observations

| | Size | Smell, Moisture Level, Decomposers | Physical Changes Occurring |
|--------|------|------------------------------------|----------------------------|
| Week 1 | | | |
| Week 2 | | | |
| Week 3 | | | |
| Week 4 | | | |
| Week 5 | | | |

What Did You Learn

[illegible]

Name: _____

Aerobic and Anaerobic

| | |
|--------------------------------------------------|----------------------------------------------------|
| Define Aerobic: _____ _____ _____ _____ | Define Anaerobic: _____ _____ _____ _____ |
| Pronunciation: Ae-ro-bic | Pronunciation: An-ae-ro-bic |

Sample 1

1. Diagnosis: Is this aerobic or anaerobic decomposition? (circle one)
2. Give two examples of how you can tell
 1. _____
 2. _____
3. If it is anaerobic, what needs to be done to make this an aerobic system? _____

Sample 2

1. Diagnosis: Is this aerobic or anaerobic decomposition? (circle one)
2. Give two examples of how you can tell
 1. _____
 2. _____
3. If it is anaerobic, what needs to be done to make this an aerobic system? _____

Sample 3

1. Diagnosis: Is this aerobic or anaerobic decomposition? (circle one)
2. Give two examples of how you can tell
 1. _____
 2. _____
3. If it is anaerobic, what needs to be done to make this an aerobic system? _____

Sample 4

1. Diagnosis: Is this aerobic or anaerobic decomposition? (circle one)
2. Give two examples of how you can tell
 1. _____
 2. _____
3. If it is anaerobic, what needs to be done to make this an aerobic system? _____

Name: _____

Creatures in Our Compost

Guiding Question: What different creatures live in the school compost at two stages of its decomposition?

Bin 1: Less Decomposed

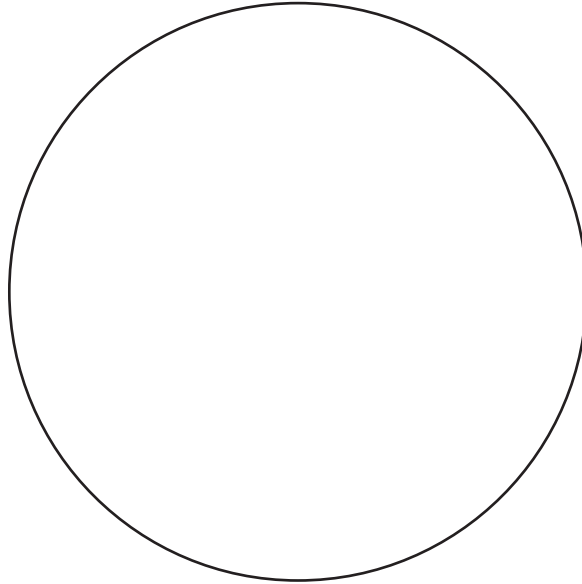
Bin 2: More Decomposed

Name: _____

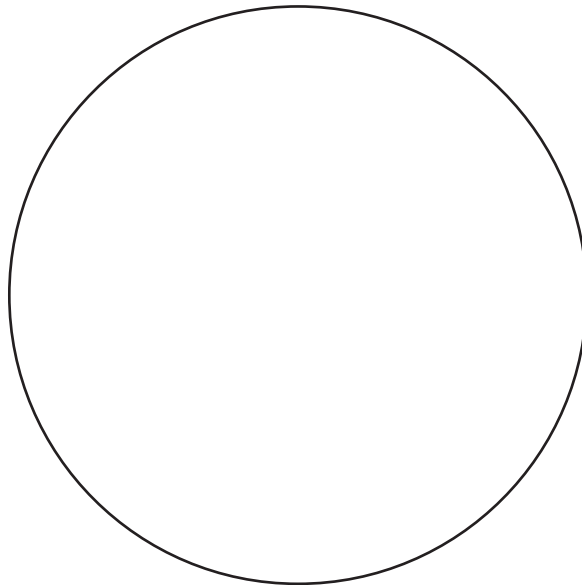
Discovering Microorganisms

Identify three different creatures and illustrate the features, movements, and characteristics of each living thing.

Slide 1



Slide 2





Name: _____

Welcome to the Garden

| | Record/Answer |
|----------------------------------------------------------------------------------|---------------|
| How many HOT compost systems does the garden have? | |
| In inches, measure the biggest slug you can find. | |
| How many footsteps does it take to walk from one end of the garden to the other? | |
| Find and name a fruit in the garden. | |
| Crush a flower and describe its smell in detail. | |
| In feet, measure the width of the widest plant you can find. | |
| How many raised beds are in the garden? | |
| Identify one edible flower. | |

Name: _____

Date: _____

The Way Water Moves

Directions

1. Find three places, one in the garden and two around the school buildings, with evidence of heavy water activity.
2. Identify, sketch, or map the space.
3. Where do you see evidence of heavy water activity?
For example, is there a puddle? How big is it? Is it in a pathway?
Is there a lot of mud? Where is the water coming from? Where is it going?

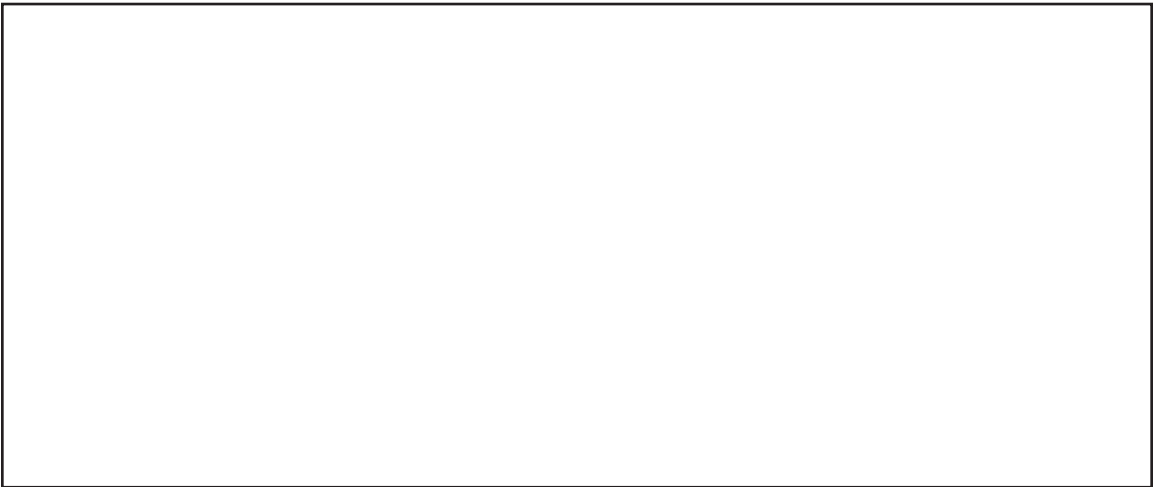
1.



2.



3.



Name: _____

The Water Catchment Race

Key Terms

Saturation: _____

Impervious: _____

Pervious: _____

| Surface | Time (seconds) | Type of Surface |
|------------------------------------|----------------|-----------------|
| Untreated wood surface (i.e., log) | | |
| Gravel | | |
| Base of a tree | | |
| Open, exposed soil | | |
| Pavement | | |

Find and name a place on the schoolyard where runoff occurs. What material is being moved? _____

Name one impervious surface on the schoolyard that is not pavement. _____

Find and name one pervious but saturated area of the schoolyard. _____

Name: _____

The Eight Rainwater Harvesting Principles

Checklist

- ☐ 1. Begin with thoughtful observation. Where is the site? Where does the water flow?

- ☐ 2. Start where the water flow begins and work your way down. How does the water travel toward the ground? How does it touch the ground?

- ☐ 3. Start small and simple.

Work on manageable projects that you can measure the success of easily, as well as build and repair.

- ☐ 4. Spread the flow of water.

Rather than have the water run off the land's surface, encourage it to slow down, stick around, and be absorbed into the soil.

- ☐ 5. Always plan an overflow route for water.

Develop a method for harvesting overflowing water during heavy rains.

- ☐ 6. Include living organic cover.

Create plant habitat in order to provide more uses for the water.

- ☐ 7. Think of multiple uses and functions for a water catchment system.

Plan your water-harvesting system to do more than hold water. It could be art, or a bird-bath, or to water plants, or anything else.

- ☐ 8. Limit the amount of human interaction with your catchment project.

In order to allow your project to last long and remain intact, think of how students won't negatively interact with it.

* Adapted from Brad Lancaster (HarvestingRainwater.com)