



Dig In!

Curriculum Guide Grades K – 2

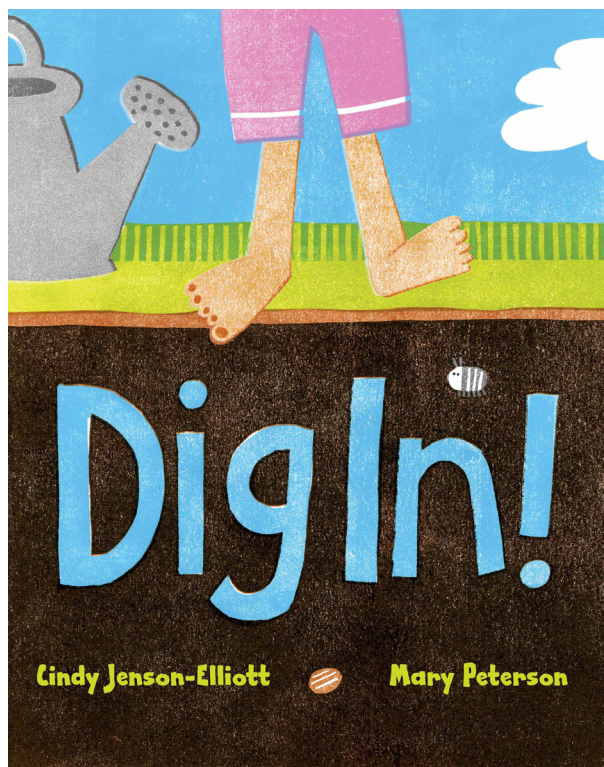
Cindy Jenson-Elliott



Mary Peterson



An Elementary Curriculum Guide Grades K – 2 to



Dear K – 2 Educator,

Just out the back door of your school lies the best educational resource money can't buy—dirt. Your schoolyard is full of the stuff, whether or not you have a school garden or fancy play yard. Dirt lies the key to engaged learning through hands-on science, Common Core literacy, and the experience of wonder.

Dirt may seem like simple stuff, but there is a lot of complex learning that can happen when you put a child's hands in the soil. In this curriculum guide you will find hands-on science lessons for using dirt and some of the animals commonly found in your schoolyard to address Next Generation Science Standards in Earth Science, Life Science, and Engineering. You will also find lessons that will help you meet Common Core writing standards for both the informational and narrative text types. Each lesson is arranged according to the 5-E model: Engage, Explore, Explain, Elaborate, Evaluate.

Please let me know how these lessons work out for you and your students, and how you extend your learning even further through your own creativity. My goal as a teacher and writer is to connect kids to the wonders of their own backyards and schoolyards through books that encourage exploration. So head outside and Dig In! Then write and tell me about your adventures! You can reach me through my website at www.cindyjensonelliott.com.

Yours, with muddy hands and a warm heart,

Cindy Jenson-Elliott, M.A.



Dig In! Activities



Next Generation Science Standards (NGSS) addressed:

Life Science:

1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

Earth Science:

K-EST 3-1: Use a model to represent the relationship between the needs of different plants and animals and the places they live.

K-2 Engineering Design:

K-2ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Common Core State Standards, Reading, Writing, Speaking, and Listening addressed:

CCSS Speaking and Listening:

- SL K-2 1, 3 with increasing complexity per grade level:
Participate in collaborative conversations with diverse partners about topics and texts with peers and adults in small and larger groups;
Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

CCSS Writing

- W K-2, 7 with increasing complexity per grade level:
Participate in shared research and writing projects.
- W K-2, 8 with increasing complexity per grade level:
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- W K-2, 2 with increasing complexity: Informative Text Type
Write informative/explanatory texts in which students name a topic and supply facts about the topic.
- W K-2, 3 with increasing complexity: Narrative Text Type
Write a narrative in which students use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.



Schoolyard Science: Dig in the Dirt



NGSS 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

CCSS Writing:

- W K-2, 7 with increasing complexity per grade level:
Participate in shared research and writing projects.
- W K-2, 8 with increasing complexity per grade level:
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Materials:

- 4 meters of string per group of students
- 1 meter stick per group
- Copies of Dig in the Dirt worksheets for each child
- Pencils or colored pencils

Directions: Divide students into groups of 2 – 4 partners

Engage: Read *Dig In!*. Ask students what they think they might find if they dug in the dirt in their schoolyard. Write down their predictions.

Explore: Pair students into groups of 2 – 4 students and give each group 4 meters of string and a meter stick. Have each group measure out one square meter of schoolyard space, in an area likely to have life-forms in the soil (not play-yard sand).

Look at the dirt on the surface closely. Use a magnifying glass. What is your dirt made of? Is it made of tiny rocks or sticks? Is it made of clay or mud? Is it in the sun or shade? Is it wet or dry?

Explain: Draw it and describe what you find on the worksheet.

Explore: Now dig in! Dig down 4 – 6 inches. What do you find underground?

Explain: Draw the dirt and what lives in it. Write a description of it all.

Elaborate: Include details in the description: What lives there? How many living things—plants and animals—can you find? How are their bodies built? What are they doing?

Evaluate: Assess student thinking through a class chart answering the questions:

What did we notice on top of the soil? Under the soil? Include information on temperature, moisture, types and numbers of animals and plants, type of soil, etc.

Compare and Contrast: How is life on top of the soil the same as and different from life underneath the soil? What conclusions can we draw as a class?



Dig In the Dirt Worksheet 1



What do you see on top of the dirt? Draw it here.

A large, empty rectangular box with a black border, intended for drawing what is seen on top of the dirt.

Draw what you find under the soil here.

A large, empty rectangular box with a black border, intended for drawing what is found under the soil.



Dig In the Dirt Worksheet 2



Observations:

Use words to describe the soil. What is it made of? Is there anything living on top of it?

What did you find under the soil? Is anything living underneath the soil? Describe it.

How is life on top of the soil different from life under the soil?

What parts of plants grow on top? What parts of plants grow underground?

Which area is hotter? Which area is cooler? Which area is wetter? Which area is dryer?

Write about what you notice.

Partners _____, _____, _____



Dig In the Dirt II



Mentor Text Study

CCSS Writing:

- W K-2, 7 with increasing complexity per grade level:
Participate in shared research and writing projects.
- W K-2, 8 with increasing complexity per grade level:
With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- W K-2, 3 with increasing complexity: Narrative Text Type
Write a narrative in which students use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.

Objective: Using *Dig In!* as a mentor text, have students create their own “Dig In” book about what they found in their schoolyard study.

Engage: Read *Dig In!*

Explore: Ask students what they notice about the text. What are some of the patterns they see?

Explain (examples):

Repetition: “I dig in the dirt, and find ...”

Alliteration: Dig, dirt

Why do you think the author chose to use a repetitive phrase?

Why do you think the author chose these particular things to find under the soil?

How does the story end? What do you think happens after the story ends?

Elaborate: Practice using lines from *Dig In!* as a mentor text to write about their own experience digging in the schoolyard.

Examples: I dig in the dirt and find ...

I scoop in the sand and find ...

Evaluate: Create a class “Dig In!” book with each student’s page about what they found when they dug in the dirt.

Have students write another ending to the book. What happens after the child creates mud? What next?



Pill Bug and Worm Study



Part I—Observation

NGSS

Earth Science: K-EST 3-1: Use a model to represent the relationship between the needs of different plants and animals and the places they live.

CCSS Speaking and Listening:

- SL K-2 1, 3 with increasing complexity per grade level:
Participate in collaborative conversations with diverse partners about topics and texts with peers and adults in small and larger groups;
Ask and answer questions in order to seek help, get information, or clarify something that is not understood.

Materials:

- Pill bugs: 5 per every pair of students
- Earthworms: 5 for every pair of students
- Soil: 5–10 cups of potting soil, or soil from outside, on a cafeteria tray or newspaper
- Moist dead leaves, lettuce, or other decomposing plant matter
- A spray bottle (teacher only)
- 1 flashlight per pair of students
- Pill Bug and Earthworm Study Worksheet I

Engage: Read *Dig In!*

Ask: What animals did the child in the book find underground?

Tell: We are going to study worms and pillbugs to see what we can learn about them.

Explore: Distribute trays, dirt, dead leaves, pillbugs, and worms to partners. Observe pill bugs and worms. Guide observation through the following questions:

- What do you notice about the way they are built?
- What are they doing? How do they interact with their environment?
- What happens when you shine a flashlight on them for five minutes? What happens when they are sprayed lightly with water?
- How are their needs different? How are they the same?

Explain: Draw their body parts on the worksheet. Draw their environment. Use words and pictures to show what the animals do in their environment.

Elaborate: With a partner, pick three things to share with the class that you observe about each animal's body and behavior. Collaborative Conversation: As a class, discuss and make a chart of what students noticed about the pill bugs and worms. Write down their unanswered questions about each.

Evaluate: With your partner, draw a picture of the animals in their environment. Draw what happened when you shone the light on them.

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Draw a model of what they need in their environment to survive. What would be the best environment for each?



Worm and Pill Bug Study Worksheet I



Draw a worm above

Draw a pill bug above

Describe the animals' behaviors.

What does the pill bug do when light shines on it or water is sprayed on it?

What does the worm do when light shines on it or water is sprayed on it?

Three things about worms and pill bugs we will share with the class:

1. _____

2. _____

3. _____



Pill Bug and Worm Study Worksheet 1, pg.2



This is the ideal environment for a worm. It must have:

This is the ideal environment for a pill bug. It must have:



Pill Bug and Worm Study Part II: Biomimicry



NGSS

K-2 Engineering Design: K-2ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Life Science: I-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.

Materials:

- Worms and pill bugs
- Magnifying glasses
- Pill Bug and Worm Study Worksheet II

Teacher Information: The structure of pill bugs and worms help them survive. A worm's mucus and its ability to expand and contract help it breathe and move through, and aerate, the soil. A pill bug's hard shell, multiple legs, and ability to curl into an armored ball help it avoid being eaten by predators and help it move safely through rough terrain, kind of like a tank.

In this activity, students will consider the adaptations, or “super powers” of each animal that help it survive in its environment. They will consider these adaptations from an engineering standpoint. Then they will copy the qualities of the worm or pill bug to design objects using biomimicry, copying nature to create something people can use to solve a problem. For example, a pill bug's ability to curl up in armor would be a good quality for a car to have in a crash, or for an iPad to have if you drop it. Or a worm's ability to digest soil would be a good quality for a tunneling machine to have. Problem: making tunnels. Solution: take in soil and spit it out the other end as fertilizer.

Engage: Look at the pictures of the pill bug and worm in *Dig In!*

Collaborative Conversation:

- Write down students' ideas from the following prompts:
- What does a worm need to be able to do to survive? What does the worm in the book do?
- How does a worm's body shape help it survive?
- What does a pill bug need to do to survive? What does the pill bug in the book do?
- How does a pill bug's body shape help it survive?

Explore: Observe a real pill bug and worm carefully. Draw them each in detail. Using the diagram on the worksheet, label the parts of your pictures.

Explain: Biomimicry—Sometimes people invent things that copy something in nature to solve a human problem. For example, one day a Swiss engineer named George de Mestral was walking in the mountains with his dog when he discovered cockleburrs stuck in his clothes and in his dog's fur. He was fascinated by how well the burrs held on to things but could be removed later fairly easily. He copied the hooking quality of these seed pods to create Velcro. Velcro solves the problem of needing to stick two objects together and pull them apart easily.

Elaborate: Invent an object that uses a worm's or a pill bug's special adaptations to solve a human problem. As a class, brainstorm problems that could be solved by the pill bug's armor or ability to curl, or by a worm's ability to stay moist or stretch.

Evaluate: With a partner, students should draw their inventions, label parts in a colorful diagram, and present their biomimicry invention to the class.



Worm and Pill Bug Study II: Biomimicry Worksheet



What great qualities does a worm have?

What great qualities does a pill bug have?

What human problem can be solved using a quality from one of these animals?

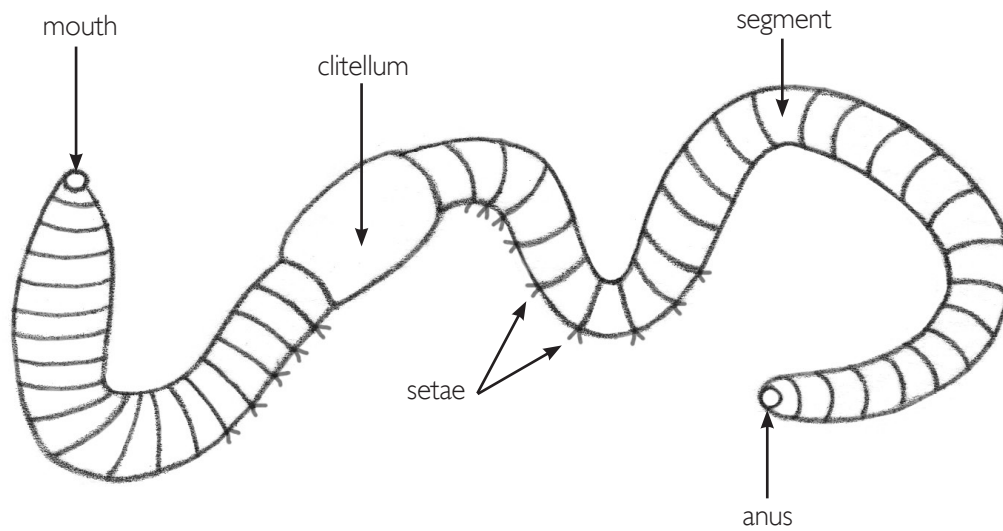
Draw your invention. Label the parts. Underneath, explain what your invention does, how it works, and how it uses qualities of the animal.



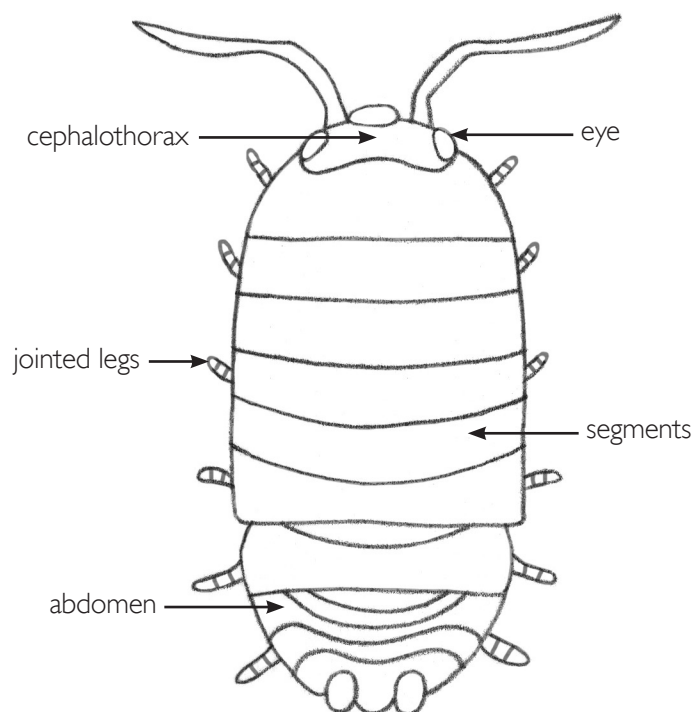
Worm and Pill Bug Study II: Biomimicry Worksheet



Worm: label the parts



Pill Bug: label the parts





Pill Bug Literacy Study Extension



CCSS Informational and Narrative Writing

Engage:

After observing pill bugs, what questions do students have? Write down students' questions on a class chart.

Explore: Research: Read out loud, or have students read informational books and websites about pill bugs. When a student hears his or her question answered, write down the answer on a class chart. Have student identify important information about their bodies, behavior, relations with the environment, and relations with others. Write down their information on a class chart.

Explain:

Have students write facts about pill bugs. For younger students, use some of the following sentence starters:

Pill bugs have _____ (body parts)

Pill bugs are _____ (behavior)

Pill bugs always _____ (behavior)

Pill bugs go _____ (environment)

Pill bugs need _____ (environment)

Pill bugs eat _____ (food)

Pill bugs seem to like _____ (relationships)

Elaborate: CCSS Narrative: Read *Diary of a Spider*, *Diary of a Fly*, or *Diary of a Worm*. Ask students to identify the facts in this fictional book.

Using this book as a mentor text, write a class "Diary of a Pill Bug" book, with each child contributing a page.

The teacher should write a sample diary entry for a pill bug. For example, "Today, I was eating some wilted lettuce when something poked me in the back. I curled up really fast. Then I saw it was only a piece of grass. Silly me!"

Have students write and illustrate their own pill bug diary entry containing information about two of the following:

- the animal's structure
- the animal's behavior
- the animal's food

Evaluate: Have students share their work with the class. Make sure each page contains real facts about the animal and that all the facts are included by the end of the book. Share the book with the school library so other classes can read it.

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