

SCED 480

Name: Wendelin Dunlap

Curriculum (Kit) Title: Water

Lesson Title: Investigation 4: Waterworks – Part 1: Water in Earth Material

Grade level: Third

Curriculum Context/Long Term

Goals: How does this lesson contribute to the big idea(s) of the curriculum (kit) and specific unit?

Big Idea & Connection of Lesson:

1) What are the big ideas of the curriculum?

Water is one of the most important substance on earth. The focus for this lesson will be the discovery of how water responds to temperature variations such as condensation, the properties of surface tension, and interaction with different materials. Water expands when it is heated and retracts when heat taken away. Surface tension causes water to stick together causing it to form into a ball. Dissolving materials into water effects properties of surface tension. Water flows more easily through some earth materials than others such as soils verses gravel. Condensation occurs when water vapor touches a cool surface and changes into liquid. Evaporation can be used to detect materials dissolved in water. Flowing water can be used to do work.

2) How does this lesson fit with one of the big ideas of the curriculum? How does this lesson help students make those connections?

Since water is so important, this lesson requires students to think about where rainwater goes when it hits the ground. Students will pour equal amounts of water through soil and gravel to observe how water moves through two common materials that make up the earth's surface. The weight of each cup and the amount of water that is left after being poured through the two materials will be measured to help understand what happens to water when it rains.

3) Are there any specific lessons that need to have preceded this lesson? Are there specific areas of knowledge, skills, or background experience that are necessary for the students to be able to successfully engage in this lesson (**content or practice**)?

Students should have already completed Surface Tension which is the introductory lesson for water. From that lesson, students should have begun to understand what happens to water when poured onto a waterproof surface. They should also understand that the surface tension of water can be broken by adding different materials. No students will have the chance to observe what happens when water is added to different materials to see how that process changes the properties of water.

Learning Targets for this lesson:

1. Content

a. Content Learning Target

Earth materials absorb different amounts of water which effects how much water runs through them.

b. Content Learning Target Assessment

Using evidence from this lesson, students will explain that the differences in porosity of soil and gravel affect how much water is absorbed versus how much passes through the materials.

c. NGSS Standard from DISCIPLINARY CORE IDEAS

ESS2.A: Earth Materials and Systems: Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

2. Science Practice Learning Targets

a. Write a target for one science practice that is the focus in your lesson. This is just a statement of the practice such as “Scientists build claims based on evidence.”

Scientists use data to evaluate claims about cause and effect.

b. Science Practice Learning Target Assessment:

Students will be able to draw lines connecting the correct examples of cause and effect and describe what criteria they used to determine which were examples or non-examples.

c. NGSS Language from Appendix F

- Practice 7 Engaging in Argument from Evidence: Grades 3-5
- Bullet one: Compare and refine arguments based on an evaluation of the evidence presented.

3. Academic Language-

a. What are the key vocabulary items (content-specific terms) or language necessary to understand this lesson?

1. Earth materials – any material that comes from or makes up the earth such as water, rocks, soil and clay.



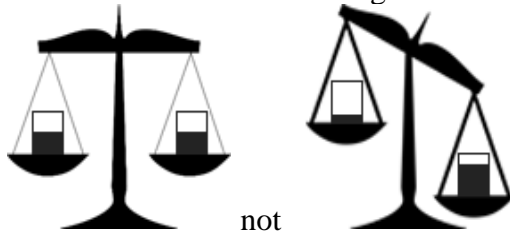
earth materials

2. Kale – a plant that is healthy to eat.



kale

3. Even and uneven– having the same amount of something like water in a glass.



even

4. Cause and effect: the cause is the first thing that happens like the shoe being untied in the picture and the effect is the second thing that happens which is the girl tripping and falling.



cause and effect

5. Properties – ways to describe things like an apple is red, sweet and shiny.



properties

6. Absorb – when something picks up liquids like water, milk or juice.



absorb

7. Drain – when a liquid goes away.



drain

8. Porous – having holes that hold water.



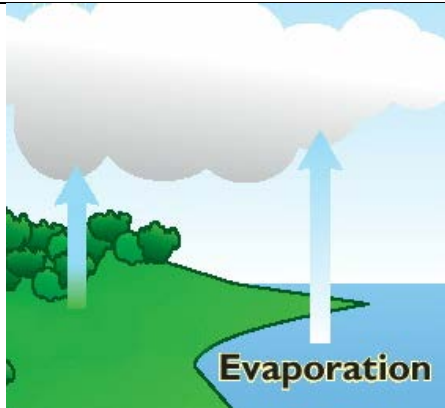
porous

9. Non-porous – not having holes so water runs off.



non-porous

10. Evaporation – when water disappears into the air.



11. Hold – to carry in your hand or in a cup.



hold

b. How will you teach students that vocabulary/language? (LAST LESSON ONLY)

As the vocabulary words come up in the lesson, the teacher will ask students what they think the word means and record different answers on an overhead projector. Teacher will ask the students which answers they feel are correct and ask why or why not.

SIOP Strategies:

1. If it is possible to demonstrate the definition: the teacher will demonstrate the property but rely on students to create and refine the definition then write it in their own words in their notebook.
2. The teacher will leave the overhead projector on during the entire assignment with the correct answers circled so that emerging ELLs can have more time to write their answers in their notebooks, ask questions as the lesson progresses and refer to the answers throughout the lesson as more hands on experience is gained.
3. The teacher will provide photos to help students see examples of the definition and associate it with other prior knowledge when possible.

YOU DO NOT NEED TO LIST MATERIALS IN SCED 480

ASSESSMENT PLAN:

What are the known misconception(s)?

Common misconceptions about materials:

- Soil is just “dirt” or “any stuff on the ground”
- Unaware that there are living organisms in soil.
- Soil is dinosaur manure.
- Soil has been here since the world was formed.
- Soil is the precursor to rock and eventually turns into rock.
- Common materials like soil are single materials and not mixtures.
- Substances like water are pure and do not have other materials mixed into them.
- Rocks (and therefore gravel) is made of a single substance.
- Minerals are not rocks.
- Gravel is usually only associated with the loose material at the side of the road.

Pre-Assessment: (content and practice):

How will you find out what/how **ALL** students think about the targeted content and science practice addressed in this lesson?

Content:

My daughter loves to eat kale, so we like to grow it on our deck. Kale needs an even amount of water to grow so each week we will give it a half cup of water. What earth material do you think we should use to grow our kale?

Each student will be given a printout for their notebooks that has a chart of kale planted in water, planted in soil and planted in gravel. Individually and quietly, students will be asked to circle the picture showing “Which earth material will give the kale the most even amount of water to grow?” They will then be asked to write down why. They will be taught the vocabulary words: kale and earth materials.

Practice:

They will be taught the vocabulary words cause and effect. Then they will be asked for initial ideas about what effect they think will happen when each plant is watered. They will be asked what they think is the cause and what they think is the effect.

Formative Assessment: (content and practice):

How will you monitor students’ emerging understandings?

Content:

The teacher will review the student pre-assessment results and monitor student’s observations in their notebooks to see if students make connections between the amount of water that is absorbed by each earth material verses the amount that has passed through. The teacher will also look for connections to which material would work best for planting the kale when the students weigh the two cups the next day to see if there are any comments about water retention of either of the materials.

Practice:

The teacher will also revisit the cause and effect initial ideas collected for the Growing Kale pre-assessment and complete the second cause and effect sheet by entering data during the experiment.

What questions could you ask about content? About science practice?

Content:

- What will happen to the water when it is poured through the soil?
- What will happen to the water when it is poured through the gravel?
- What caused the cups to have different weights after the water was poured through them?

- What caused the cup with the soil heavier?
- What caused the water that passed through the soil turn a bit brown?
- Why did more water pass through the gravel than the soil?
- What caused the cup with the soil to still heavier the next day?
- Did the filter paper make a difference?
- What makes the soil different than the gravel?

Practice:

- What does the word cause mean?
- What does the word effect mean?
- If I said there was a connection between cause and effect, what would you say it is?

What should student answers look like if learning is on target?

Students' answers should contain evidence to support or disprove the initial ideas on the pre-assessment and why the two materials behaved so differently when the water was passed through them. The students' notebooks should have drawings, charts and written observations of the different weights and amounts of water from the day of the experiment and the day after. Students will complete the cause and effect portion of the sheet for the day after.

Content:

- Not as much water came through when we poured the water through the soil.
- More water came through when we poured the water through the gravel.
- The cup with the soil was heavier than the cup with the gravel when we put them back on the level after pouring the water through both.
- The cup with the soil absorbed more water which caused it to be heavier.
- The water that passed through the soil looked a bit brown but the soil passed through the gravel was still the same color.
- The gravel did not absorb as much water which caused it to be lighter.

Practice:

- Cause is the first thing that happens.
- Effect is the second thing that happens.
- The cause makes the effect happen.

Summative Assessment: (content and practice):

How will students demonstrate that they have met both of your learning targets?

Is your assessment measurable or observable?

Content:

Students should be report that some earth materials, like potting soil, are more porous which makes them absorb more water causing the cups to weigh more. Other earth materials, like gravel, are non-porous which caused more water to pass through making the cup lighter. Students will watch a teacher demonstration of pouring a ½ cup of water into an actual pot with kale planted in clay, soil and gravel.

Practice:

Students will be able to state the causes and effects for both the pre-assessment and experiment. At the end of the lesson, they will be able to compare their initial effects predicted in the pre-assessment with the actual effects to reinforce the practice of using cause and effect to evaluate data.

REQUIRED LESSON COMPONENTS

COMMUNICATING LEARNING TARGETS:

DO NOT state the Learning Target you developed for the lesson. One option is to state the general expectations. Another option is to state the challenge question for this lesson; e.g., “How does electricity flow?” or “Why are plankton important to the ocean ecosystem?”

Teacher

How do the properties of a material effect how much water passed through it verses being absorbed?

Student

It depends on how porous the material is because the more porous materials like soil trap more than non-porous materials like gravel.

ELICITING INITIAL IDEAS

How will you structure the lesson so that students:

- become aware of their initial ideas
- explain their thinking
- record initial ideas
- share their ideas in a small group and/or whole class

(Note: this is not just a review of previous lessons or past experiences –it is what they know about the learning targets *IN THIS LESSON*)

Teacher

For this entire lesson, students should be divided into small groups – 4 per group would be optimal.

Pre-assessment –

The teacher uses the color “Growing Kale” sheet for teachers on the overhead projector for reference while telling the “Kale Story.”

Teacher: My daughter loves to eat kale, so we like to grow it on our deck.
This is a picture of kale (if you can find real live kale, bring that instead – for extra fun, bring in kale chips):



kale

Has anyone ever eaten kale? Raise your hands if you have.
Has anyone ever told you anything about eating kale? Raise your hands if you have.
Compile answers on the overhead projector to come up with a definition similar to “Kale is a plant that is healthy to eat.”

Student

Students divide into groups of 4 at their science tables.

Students listen quietly.

Students raise their hands if they have ever eaten kale.

Students will raise their hands to give individual answers about eating kale.

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Kale’s roots need to have an even amount of water all week long for the leaves to grow. Each week we will give it a half cup of water. We bought our kale plants and now need to plant them. We are going to look at our options for planting the kale.

Teacher: Each picture shows kale planted in a different earth material. Does anyone know what an earth material is?

Here is a picture of some earth materials:



earth materials

What do you see in the picture that could be an earth material?

Compile answers on the overhead projector to come up with a definition similar to “any material that comes from or makes up the earth such as water, rocks, soil and clay.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Teacher passes out a 3-hole punched duplexed Growing Kale Data Collection sheets with the following chart so students can record initial claims and share their ideas in small groups. Teacher will have a version for the overhead projector that she will write the class’s answers on.

Earth Material	Why/why not chosen?	What really happened?
Clay		
Soil		
Gravel		

Teacher: Here is a chart for your notebooks so each of you can write down the class answers in the first column for today.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students will raise their hands to give individual answers about what an earth material is.

Students will raise their hands to give individual answers about what possible earth materials they see in the photo.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Everyone individually without looking at your neighbors' paper or discussing your thoughts, circle A, B or C for what material you would plant your kale in.

[Wait]

Great, now take the next few minutes to individually write down your thoughts about why you chose your answer and why you didn't choose the other earth materials. Circle your answer on your papers.

[Wait]

After the students seem to have written down their initial ideas...

Teacher: Now discuss your ideas with your small group.

I want to hear what your and your classmate's answers are so write down everyone's answers on your sheet while I write them up here.

[Wait]

Who chose clay and why - raise your hands.

[Call on students and write answers on the overhead until all answers are collected]

Who chose soil and why? - raise your hands.

[Call on students and write answers on the overhead until all answers are collected]

Who chose gravel and why? - raise your hands.

[Call on students and write answers on the overhead until all answers are collected]

Turn over your data sheets.

Teacher will have a version for the overhead projector that she will write the class's answers on.

Does anyone know what the word cause means?

[Wait for answers.]

Does anyone know what the word effect means?

[Wait for answers.]

If I show you this picture, can you tell me your ideas about cause or effect?

[Wait for answers.]

The students will circle one letter based upon prior background knowledge.

Students will write reasons for choosing a letter on their papers. Students will create claims based upon their prior background knowledge.

Students share their claims in small groups.

Students raise their hands if they chose clay and answer why when called on.

Students raise their hands if they chose clay and answer why when called on.

Students raise their hands if they chose clay and answer why when called on.

Students will write the answers on their charts while the teacher writes them on the overhead projector.

Students will turn over their data sheets.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.



(purposely left blank to start)

Look closely at this picture. If I said there was a connection between cause and effect, what would you say it is?

Compile answers on the overhead projector to come up with a definition similar to “the cause is the first thing that happens like the shoe being untied in the picture and the effect is the second thing that happens which is the girl tripping and falling.” Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

In the first box it says “Pour water into the pot with clay.”

What could that be?

[Wait for answers]

If students are confused restate – Since the first thing I am doing is pouring water what would it be?

[Wait for answers]

Collect answers until students come up with “cause.”

Write the word cause on the top line above the first box and then write your definition of cause below it on the sheet.

[Wait]

Are all of the boxes in the first column filled with causes?

[Wait]

If all of the boxes in the first column are causes, what do you think the shapes in the second column will be?

[Wait]

Collect answers until students come up with “effect.”

Write the word effect on the top line above the second column and then write your definition of effect below it on the sheet.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students write “cause” on their sheets with their definition.

Students raise their hands with answers.

Students raise their hands with answers.

<p>[Wait] Without asking your neighbor, write down on your papers what you think will happen if I pour the water into each of the three pots?</p> <p>[Wait] Now share your answers with your small group. When you are done sharing, raise your hands and then I will call on each table for answers.</p> <p>[Call on students for answers] When all groups have their hands raised, call on students for answers.</p> <p>So now that you know what cause and effect are, make an arrow between the rectangle and the silly shape to show what happens first and what happened second.</p> <p><i>Teacher tells students to put their “Cause and Effect” papers in their notebooks and to clear off their desks.</i></p> <p>By the end of the lesson students should be able to help tell why soil would allow for the most even distribution of water. They will also be able to say what the cause is and what the effect is.</p>	<p>Students write “effect” on their sheets with their definition.</p> <p>Students write on their sheets.</p> <p>Students share in groups then raise hands.</p> <p>Students share their answers.</p> <p>Students draw the arrows.</p> <p>Students put their papers in their notebooks and clear their desks.</p>
<p>ENGAGING with DATA/EVIDENCE This is the section in which the students engage in an investigation to gather evidence and make observations. Students should connect the data collected to the investigative question (why are these data important?) Students should record their data Generally the teaching of the science practice begins here (but that can vary)</p>	
<p><u>Teacher</u> <i>For each group of students, prepare two small plastic cups with the earth materials. The soil cup should be filled $\frac{3}{4}$ of the way and the gravel cup should be filled $\frac{1}{4}$ of the way. Also prepare a set of cups for the teacher’s demonstration.</i></p> <p><i>Pass out the duplexed Water in Earth Materials Experiment and Data Collection sheets.</i></p> <p>1. <i>Talk about where rain goes</i> Teacher: When it rains, where does the water go? [Wait for answers] If they do not mention that some is absorbed into the ground, prompt them.</p> <p>2. <i>Think about water in earth materials</i></p>	<p><u>Student</u></p> <p>Students raise their hands with answers.</p> <p>Students listen quietly.</p>

Teacher: Today we are going to experiment with water and earth materials. I have two cups with earth materials in them (place them on the overhead projector).

Who can tell me their definition of earth materials?
Raise your hands.

[Call on one or more students until you have a definition of water that meets criteria in this lesson]

Okay, getters, please each get one cup of each earth material and two hand lenses for your group.

Once you have the materials on your tables, take turns with the hand lenses and look closely at the two materials.

Put your finger in each cup to feel the materials without removing them from the cup.

[Wait]

When you have finished, raise your hand to tell me what you saw.

[Wait for hands, then call on people]

Write the answers in a simple chart on the board and ask students to do the same in the chart on their papers.

soil	gravel
brown	gray

[Wait]

Does anyone know what your observations are called?

[Wait]

If I asked you to tell me something about the apple in this picture, raise your hands to tell me what you would say?



properties

Students may remember the definition or look in the vocabulary section of their notebooks.

Getters get the materials from the stuff table.

Students take turns examining the two materials with the hand lenses.

Students put their finger in the cups without dumping them.

Students raise their hands with answers.

Students write their answers on their papers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

[Wait]

So what would you say a property is?

[Wait]

Compile answers on the overhead projector to come up with a definition similar to “ways to describe things like an apple is red and shiny”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

3. Think about water in earth materials

Teacher: Without asking your neighbor, what do you think will happen if you add water to each of these earth materials?

[Wait]

Write your guesses under each material in your chart.

[Wait]

Okay, let’s do an experiment to find out.

4. Introduce the investigation procedure – show students each of the materials used and bag all but the balances and put post them on the wall in a labeled bag. Label the balance and leave it on the front table. Go over the steps but do not actually pour the water in the cups.

Teacher: I am going to show you how to do today’s experiment. Please pay close attention.

Step 1: Put a filter into each of the two plastic cups with holes in the bottom.

Step 2: Pour some dry soil into the filter paper until it is about 1 cm below the top of the cup.

Step 3: Put the cup on one side of the balance.

Step 4: Put the other cup with the filter in it on the other side of the balance.

Step 5: Pour gravel into the cup until the balance is even. Does anyone know what the word even is?

[Wait]

Here is an example of even cups of water:



even

Here is an example of un-even cups of water:

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students quietly think about their answers.

Students write their guesses under each material in their charts.

Students raise their hands to guess what each material is. Once the correct name is guessed, the class repeats the name together and the teacher posts the item to the wall.

Students listen quietly and watch what the teacher is doing.

Students raise their hands with answers.



un-even

What do you think the word even means?

[Wait]

Collect answers on the overhead projector until the students say something about that “they are the same weight.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Step 6: Put each small cup with earth materials on top of the bigger cup – to not pour the earth materials into the larger cup, just put it on top.

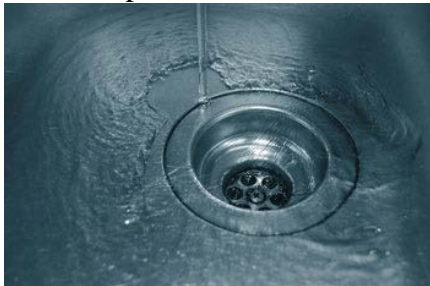
Step 7: Now I am going to pretend to fill the syringe with 50 ml of water and squirt the same amount of water into each cup. (Fill the syringe with water but don’t actually squirt the water into the cups).

Step 8: Watch what happens when you are squirting the water into the cups. Then let the cups sit there for about 5 minutes or until all of the water has drained from the cup.

Does anyone know what the word drain means?

[Wait]

Here is a picture of a drain, what is happening?



drain

[Wait]

Collect answers on the overhead projector until the students say that “the liquid disappears, goes through or goes away.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

Step 9: Put the small cups with the holes back into the two sides of the balance. Write down which is

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students listen quietly and watch what the teacher is doing.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students listen quietly and watch what the teacher is doing.

<p>heavier under the soil or gravel column in your chart.</p> <p>Step 10: Now pour the water into the graduated cylinder from the big cup that the soil drained into. Write down how many ML you measure under the soil column in your notebooks.</p> <p>Step 11: Do the same thing for the big cup that the gravel drained into. Make sure you write your answers on your data sheets.</p> <p>If you forget a step, just turn your data sheet over to see the steps I just did.</p> <p>Any questions before we begin? [Wait 11 seconds]</p> <p><i>5. Get equipment and begin</i></p> <p>Teacher: Getters please get all of the things you need for your experiments and return to your groups and begin. Walk around the room to answer remaining questions and monitor methods and progress. [Wait until groups seem to be finishing up]</p> <p><i>6. Clean up</i></p> <p>Teacher: After you have written which cup is heavier and how many ML of water was left in the two cups. (I worry that trying to have them remove the filter paper may affect the results if they spill any of the materials). Have the getters bring the balance to the overnight table and then place the two small cups to the balance. Then have the getter bring everything else back to the stuff table.</p>	<p>Students raise their hands if they have questions.</p> <p>Getters get the materials from the stuff table and return to their groups.</p> <p>Students do the experiment and record data on their sheet.</p> <p>The getter brings the balance to the overnight table and then brings the small cups to put in the balance. Finally, the getter brings everything else back to the stuff table.</p>
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USING EVIDENCE to DRAW CONCLUSIONS and MAKE CLAIMS

In the lesson, students should:

- Reflect on meaning of the data/experience.
- Facilitate interpretations of the data/experience.
- Use evidence to support their own claims - use evidence from investigation to create claims about bug.
- Critique claims of other students - done in the investigation.
- Draw conclusions - from pre-assessment and investigation - find similarities.
- Make sure that you have taught the learning target for practice as well.

<p><u>Teacher</u></p> <p><i>7. Discuss results –</i></p> <p>Teacher: Which earth material was heavier after you poured the water through it?</p> <p>Raise your hand if you wrote down gravel. [Wait]</p> <p>Raise your hand if you wrote down soil.</p>	<p><u>Students</u></p> <p>Students raise their hands if they chose gravel.</p> <p>Students raise their hands if they chose soil.</p>
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[Wait]

Which do you think is the right answer?

[Wait for answers]

How do you know that the weights changed?

[Wait for answers]

Does anyone remember what the word *cause* means?

Compile answers to come up with a definition similar to “the cause is the first thing that happens like the shoe being untied in the picture (remind them about the shoe untied picture if they don’t bring it up).”

What do you think *caused* the weights to change?

[Wait for answers]

Compile answers to come up with a cause similar to “pouring the water through the materials.”

Everyone write the definition of cause in your own words in the vocabulary section of your notebook.

Does anyone remember what *effect* means?

Compile answers to come up with a definition similar to “the effect is the second thing that happens which is the girl tripping and falling (again remind them of girl tripping picture).”

If pouring the water was the *cause*, what was the *effect*?

[Wait for answers]

Compile answers to come up with a cause similar to “the materials got heavier.”

Why do you think the soil cup got heavier?

[Wait]

Does anyone know what the word absorb means?

[Wait]

What is in this picture?

[Wait]



Absorb

What do you think it is doing?

[Wait]

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Collect answers on the overhead projector until the students say something similar to “when something picks up liquids like water, milk or juice.”
Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Why can a sponge absorb water? Tell me what properties of the sponge could help it absorb water. If you forget what the word properties means, look in your notebooks.

[Wait]

Collect answers until the students say something similar to “it has holes, it is light when it is dry and heavier when wet, it has space for water.”
Everyone write the properties after the definition of absorb in the vocabulary section of your notebook.

[Wait]

Does anyone know what the word porous means?

[Wait]

Looking at the picture of this porous rock, how does it look like the sponge?



porous

So what do you think porous means?

Collect answers on the overhead projector until the students say something similar to “having holes that hold water.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Which earth material absorbed more water?

[Wait for answers]

What other data that you recorded in your notebooks would go with your claim?

[Wait for answers]

Why do you think the soil absorbed more water?

[Wait for answers about less water draining through the soil cup]

Why do you think the gravel cup is lighter?

[Wait]

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students will write down properties after the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

What other data that you recorded in your notebooks would go with your claim?

[Wait]

Why do you think the gravel absorbed less water?

[Wait]

Does anyone know what the word non-porous means?

[Wait]

Looking at this picture, how is this rock different from the sponge?



non-porous

Collect answers on the overhead projector until the students say something similar to “not having holes so water runs off.” Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Let’s go back to cause and effect. What **caused**, the soil to absorb more water?

[Wait]

Collect answers until the students say something similar to “having holes or space to trap the water.”

What **caused**, the gravel to absorb less water?

[Wait]

Collect answers until the students say something similar to “not having holes so water runs off.”

Then what was the effect of absorbing more water?

[Wait]

Collect answers until the students say something similar to “the soil cup got heavier.”

What was the effect of absorbing less water?

[Wait]

Collect answers until the students say something similar to “the gravel cup was lighter than the soil cup.”

So, what is a good definition for effect?

[Wait]

Compile answers to come up with a definition similar to “the effect is the second thing that happens which is

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

<p>the girl tripping and falling or the soil cup getting heavier.” Everyone write the definition in your own words in the vocabulary section of your notebook. [Wait] Think to yourselves, why you might want to know which earth material allows water to drain more quickly and write it in your notebook. [Wait] We are going to leave the cups in the balances overnight. Think to yourselves and then write in your notebooks what you think might happen overnight. [Wait] 8. <i>Allow soil and gravel in cups to dry overnight</i> Teacher: We are done with this experiment for today. Put your notebooks away.</p> <p>After weighing the cup soil and gravel cups on the balance, students will see that the weight has changed and be able to support their claims of porosity affecting the weight with evidence they collected by measuring the amount of water that passed through each substance.</p>	<p>Students will write their thoughts in their notebooks.</p> <p>Students will write their thoughts in their notebooks.</p> <p>Students put their notebooks away.</p>
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<p>MAKING SENSE OF THE LESSON: Students are led to reflect on what they learned and connect it back to the big idea. Teacher organizes this through questions! Students must be expected to make sense – the teacher cannot do it for them. You must list specific questions you plan to ask students in this section.</p> <p><u>1) SYNTHESIS</u> Use evidence to support and critique claims about the learning target</p> <p><u>2) CONNECTIONS</u> Students connect what they did to learning targets Connect to other ideas they already know (such as what I know about shadows helps me understand the phases of the moon)</p> <p><u>3) REFLECTION</u> Compare their emerging ideas to initial claims What made ideas change? How do the ideas in this lesson help us understand the bigger ideas of the unit?</p>	
<p><u>Teacher</u> 9. <i>Observe earth materials the next day</i> Teacher: What was the <i>effect</i> of leaving the cups overnight? If you forget what the word effect means, look at the vocabulary page in your notebook. Compile answers to come up with “they got more balanced/even.”</p> <p>Teacher begins making a chart on the board with an Effect column. Write “more balanced” under the</p>	<p><u>Student</u></p> <p>Students raise their hands with answers.</p> <p>Students draw the chart in their notebooks.</p>

effect column. Everyone draw this same chart in your notebooks.

Raise your hand if that is the same as what you wrote in your notebook yesterday.

[Wait]

Raise your hand if you wrote something different in your notebook yesterday.

[Wait]

Call on students with their hands raised to collect different claims and write them in the chart.

Effect	Cause/Why?
More balanced	
Less balanced	
even	

[Wait]

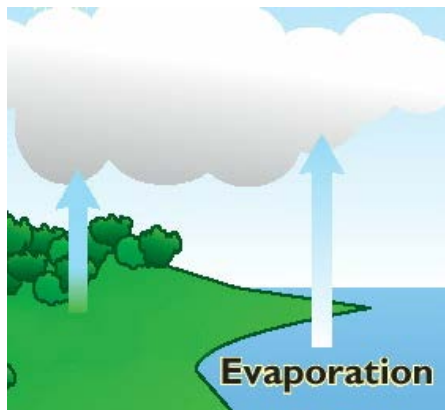
Okay, what do you think caused the cups to get more even in the balance? Write your answers in the chart under “cause.”

[Wait]

Has anyone heard of evaporation? Raise your hand if you can tell me what it is.

[Wait]

Looking at this picture, can you tell me anything else about evaporation?



Compile answers on the overhead projector to come up with a definition similar to “when water disappears into the air.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

Students raise their hands if it is the same.

Students raise their hands if they wrote something different.

Students raise their hands with answers.

Students write their answers in the chart.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students write in their charts and then raise their hands with answers.

How do you think evaporation caused any changes since yesterday? Write them in your chart then raise your hand with your answers.

[Wait]

Compile answers to come up with something similar to “when water evaporated, it made the cups lighter.” Everyone write the answer in your own words after the definition of evaporation in the vocabulary section of your notebook.

[Wait]

If evaporation made the cups lighter, then why aren't the cups even on the balance?

[Wait]

Does anyone know what the word hold means?



hold

Compile answers on the overhead projector to come up with a definition similar to “to carry in your hand or in a cup.”

Everyone write the definition in your own words in the vocabulary section of your notebook.

[Wait]

What do you think happened in the soil cup that kept it heavier than the gravel?

Compile answers to come up with something similar to “the soil was able to hold more water than the gravel because it absorbed more/was more porous.”

Everyone write that after the definition of hold in your own words in the vocabulary section of your notebook.

[Wait]

Going back to the other question I asked you to answer yesterday, Raise your hands the answers you wrote about why you might want to know which earth material allows water to drain more quickly.

Students will write after the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students raise their hands with answers.

Students will write down their version of the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students will write after the definition in the vocabulary section of their notebooks.

Students raise their hands with answers.

Students write in their notebooks.

Students raise their hands with answers.

Compile answers to come up with something similar to “so you can tell how much water will stay in the earth materials.”

Everyone write that in your own words in your notebook.

[Wait]

What else did we do with earth materials in pots this week?

Compile answers to come up with information from the Growing Kale example.

[Wait]

Everyone go to your “Growing Kale Data Collection” sheets in your notebooks.

[Wait]

Look at why you chose A. clay, B. soil or C. gravel as the best earth material because it would hold water evenly.

[Wait]

Who still believes it is A. clay? Raise your hand.

Who still believes it is B. soil? Raise your hand.

Who still believes it is C. gravel? Raise your hand.

I am going to show you what happens when I pour a ½ cup of water into each pot.

Now, under “What really happened” you are going to take notes about what happens.

What could you label each of those columns under “What really happened”

Compile answers until they come up with cause and effect.

[Wait]

What would you label the first column?

[Wait]

Yes, label it “cause.”

[Wait]

What would you label the second column?

[Wait]

Yes, label it “effect.”

[Wait]

What is the cause going to be for A. clay?

What is the cause going to be for B. soil?

What is the cause going to be for C. gravel?

Write the causes under the “cause” column.

[Wait]

Based on the soil and gravel experiment, what do you think will happen when I pour a ½ cup of water through the gravel?

Students open to the Growing Kale Data sheet

Students raise their hands for their answers.

Students watch and listen

Students raise their hands with answers.

Students raise their hands with answers.

Students label the first column cause.

Students raise their hands with answers.

Students label the second column effect.

Students write pouring water in their notebooks

Students raise their hands with answers.

Students raise their hands with answers.

Students raise their hands with answers.

<p>[Wait] What do you think will happen when I pour a ½ cup of water through the soil?</p> <p>[Wait] What do you think will happen when I pour a ½ cup of water through the clay?</p> <p>[Wait] Watch me and write down the effect for each earth material.</p> <p>[Wait] <i>Teacher slowly pours the water through each earth material and waits for students to finish writing between each pour.</i></p> <p>What really happened when I poured the water through the gravel? Raise your hands.</p> <p>[Wait] What really happened when I poured the water through the soil? Raise your hands.</p> <p>[Wait] What really happened when I poured the water through the clay? Raise your hands.</p> <p>[Wait] Which earth material do you now think will be the best so our kale roots can have an even amount of water all week long? Compile data until they come up with soil.</p> <p>[Wait] Why? Compile answers until they come up with something like the soil is the best for evenly holding water.</p> <p>[Wait] Circle the effect that will work the best and write on your sheets why.</p> <p>[Wait]</p>	<p>Students watch and then write.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students circle soil and write why on their sheets.</p>
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APPLY OR EXTEND NEW UNDERSTANDING IN A NEW CONTEXT
Students apply or extend their learning to a slightly different context. This can lead into next lesson.

<p><u>Teacher</u> Here are two pictures: What is happening in the first picture? Collect data until the students come up with something like water being blocked or not draining.</p> <p>[Wait] What earth material do the same when water is poured into it? Collect data until the students come up with something like clay also causes water to be blocked or not drain.</p> <p>[Wait]</p>	<p><u>Student</u> Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p>
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Chronicle / Chris Hardy



What is happening in the second picture?
Collect data until the students come up with something like water is going down a drain.

[Wait]

What earth material do the same when water is poured into it?

Collect data until the students come up with gravel.

[Wait]

Now you can see that other things than earth materials allow water to drain or stop it from draining.

[Wait]

Does anyone have any questions?

[Wait]

Teacher passes out Cause and Effect New Context sheet.

Here is a sheet with some causes and effects.

[Wait]

Draw lines starting at the cause and with the arrow pointing to the correct effect.

[Wait]

Students raise their hands with answers.

Students raise their hands with answers.

Students nod in agreement.

<p>What were some of the causes that you found on your sheets? Collect answers until they say a wave came, the sun was shining and it started to rain. [Wait] How did you know they were causes? Collect answers until they say something like “because they happened first.” [Wait] What were some of the effects that you found on your sheets? Collect answers until they say my sand castle broke, I got warm, I opened my umbrella. [Wait] How did you know they were effects? Collect answers until they say something like “I get warm when the sun comes out, I know that waves break sand castles, I use an umbrella in the rain (okay maybe not in the NW)” [Wait] Were there any that did not match up? Collect answers until they say I sat down, The teacher said to stand in a line. [Wait] Why? Collect answers until they say something like “they have nothing to do with each other.” [Wait] Great work, we are done for today and you can put your notebooks away.</p>	<p>Students raise hands with questions.</p> <p>Students look at their sheets.</p> <p>Students draw lines between cause and effect pairs with the arrow pointing towards the effect.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students raise their hands with answers.</p> <p>Students put notebooks away.</p>
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