4th Grade Science

Quarter 1

Remote Learning

Practice and Enrichment Packet

Hello SCS Family,

This resource packet was designed to provide students with activities which can be completed at home independently or with the guidance and supervision of family members or other adults. The activities are aligned to the TN Academic Standards for Science and will provide additional practice opportunities for students to develop and demonstrate their knowledge and understanding.

A suggested pacing guide is included; however, students can complete the activities in any order over the course of several days. Below is a table of contents which lists each activity.

4th Grade Science Project: Plant Investigation	
Grade Level Standard(s)	4.LS2.1: Support an argument with evidence that plants get the materials they need for growth and reproduction chiefly through a process in which they use carbon dioxide from the air, water, and energy from the sun to produce sugars, plant materials, and waste (oxygen); and that this process is called photosynthesis.
Caregiver Support Option	Help your student by guiding them through the directions. Help your student to plant a seed in soil, gravel, and sand to determine which of the three materials best allows the plant to grow.
Materials Needed	plant pots, soil, gravel, sand, water, beaker, seeds, pan balance, graduated cylinder or measuring cup, ruler
Essential Question	What do plants need to survive?
Learning Outcome	Students will be able to argue from evidence to show what plants need to survive.

ELABORATE Name_____ Date _____

Research, Investigate, and Communicate

Inquiry Activity

Plant Investigation

You will investigate how different materials used to pot plants affect the growth of the plants.

Write a Hypothesis Which material will affect plantgrowth the most? Write your hypothesis as an "If . . ., then . . . " statement.

_____

_____

_____

_____

Materials

- ☐ plant pots
- ☐ soil, gravel, sand
- ☐ water
- ☐ beaker
- ☐ seeds
- ☐ pan balance
- ☐ graduated cylinder
- ☐ ruler

Carry Out an Investigation

Plan your investigation below. Remember to keep the amount of water the same and to place the plants in the same area.

1 **Record Data** Record the growth of your plants in the table.

	Soil	Gravel	Sand
Starting Height in cm			
Growth in cm After 3 Days			
Growth in cm After 6 Days			
Growth in cm After 9 Days			

Name_____ Date _____ ELABORATE

2 **Record Data** What happened to the seeds? Draw your observations of the seeds for each time frame in the table below.

	Soil	Gravel	Sand
Growth After 3 Days			
Growth After 6 Days			

Growth After 9 Days			

ELABORATE Name _____ Date _____

Communicate Information

1. How did the material the seed was planted in affect the seeds' growth?

2. Look at the data you collected and observations you made. Describe how the growth of your seeds have changed over time.

3. How did this investigation support your hypothesis?

Writing in Science On a separate piece of paper, write a paragraph about why the plant grew the most in the material it did and why it didn't grow as fast in the other two materials.

4th Grade Science Activity: Foxes and Rabbits	
Grade Level Standard(s)	4.LS2.2: Develop models of terrestrial and aquatic food chains to describe the movement of energy among producers, herbivores, carnivores, omnivores, and decomposers. 4.LS2.3: Using information about the roles of organisms (producers, consumers, decomposers), evaluate how those roles in food chains are interconnected in a food web, and communicate how the organisms are continuously able to meet their needs in a stable food web.
Caregiver Support Option	Help your student by guiding them through the directions. Help your student follow the instructions of the activity to simulate the changes in fox and rabbit populations in an ecosystem.
Materials Needed	masking tape, eight 7.5-cm cardboard squares, one hundred 2.5-cm construction paper squares
Essential Question	How does energy flow in an ecosystem?
Learning Outcome	Students will be able to model how energy moves within a food chain and food web.

Name_____ Date _____ EXPLORE

Inquiry Activity

Foxes and Rabbits

How do predator and prey relationships affect each other?

Make a Prediction What happens to the population of rabbits when the population of foxes increases?

_____

_____

_____

_____

_____

Materials

- ☐ masking tape
- ☐ 8 7.5-cm cardboard squares
- ☐ 100 2.5-cm construction paper squares

Carry Out an Investigation

1. Use the tape to mark off a 60-cm by 60-cm square. This square represents a forest. Distribute 10 of the small squares within the forest. These squares represent rabbits.

2. The larger squares represent foxes. The fox must touch at least one rabbit square to live. If it touches three or more rabbits, then it will reproduce. If the fox reproduces, then you will toss another fox in for the next trial.

3. **Record Data** Toss one fox into the forest. Remove any rabbits that the fox touches. Record the results in the data table on the next page.

4. At the start of the next trial, double the number of rabbits remaining from the first trial to represent new rabbit offspring. Place these new rabbits in the forest.

5. If the entire rabbit population was removed by the fox, add three new rabbits to the forest to represent new rabbits moving into the area. If all of your foxes starve, then add a fox to represent a new fox moving into the area.

6. In each additional trial, throw each fox square once. This includes any surviving foxes from previous trials and any offspring produced in previous trials. Record the results in the data table.

EXPLORE

Name _____ Date _____

Trial	Number of Rabbits Left	Number of Foxes Left	Number of Rabbits Caught	Number of New Rabbits in Next Trial	Number of New Foxes in Next Trial

Communicate Information

1. What happened to the population of foxes as the population of rabbits increased?

2. Was your prediction correct? Why or why not?

3. What other populations in a forest ecosystem might be affected by these population changes?

4. What would happen if the plant

population in the forest decreased?

_____

_____

_____

4th Grade Science Activity: Solve for an Invasive Species	
Grade Level Standard(s)	4.LS2.4: Develop and use models to determine the effects of introducing a species to, or removing a species from an ecosystem and how either one can damage the balance of an ecosystem.
Caregiver Support Option	Help your student by guiding them through the directions. Help your student design a solution to the invasive species problem that they have researched.
Materials Needed	research materials (attached)
Essential Question	How do changes affect ecosystems?
Learning Outcome	Students will be able to model how the introduction or removal of organisms affects the stability of an ecosystem.

Name_____Date _____ EVALUATE

Performance Task

Solve for an Invasive Species

You will think like a wildlife conservationist to research the emerald ash borer, an invasive species. You will define a problem it causes and design a possible solution.

Research Find information about the emerald ash borer. Record your notes below.

1. What is the name of the invasive species?

_____

2. Where is the invasive species originally from?

_____

3. Which ecosystem is it in now? How did it get there?

_____

_____

_____

4 How does this invasive species affect the ecosystem it is in now?

5 What other information is interesting about this invasive species?

Define a Problem Use your research to define the problem that is caused by the invasive species.

EVALUATE Name_____ Date _____

Design a Solution

Use what you have learned about balance in ecosystems to design a model of a solution to the problem caused by the invasive species that you researched.

Communicate Information

1. How does your solution solve the problem that is caused by the invasive species?

2. What can others learn from your solution in order to help stop the spread of invasive species?

Name_____ Date _____ EVALUATE

Essential Question

How do changes affect ecosystems?

Think about the photo of the damage to the ash tree that you saw at the beginning of the lesson. Explain how an invasive species is affecting the population of the trees.

Science and Engineering Practices

Review the "I can..." statement you wrote earlier in the lesson. Explain what you have accomplished in this lesson by completing the "I did..." statement.

Now that you're done with the lesson, share what you did!

I did:

Emerald Ash Borer

Photo by David Cappaert, Michigan State University, Bugwood.org

What is it?

Originally from Asia, the emerald ash borer (EAB) was first discovered in the Detroit area in 2002. It is believed to have entered the country on wooden packing materials from China. The bright metallic-green beetle may be smaller than a dime, but it is capable of taking down ash trees

thousands of times its size. Adults are typically ½ inch long and ⅛ inch wide. Eggs are extremely small—approximately 1/25 inch—and are reddish-brown in color. Larvae are white, flat-headed borers with distinct segmentation.

Adults usually emerge in mid- to late-May from infestations to the trees during the previous year (earlier if the weather is warm), with females laying their eggs shortly after. The larvae bore into the ash tree and feed under the bark, leaving tracks visible underneath. The feeding disrupts the tree's ability to transport water and nutrients, resulting in dieback and bark splitting.

What is the threat?

Ash trees are one of the most valuable and abundant North American woodland trees: estimates of total number of ash trees in the United States alone range between seven and nine billion. The emerald ash borer has destroyed 40 million ash trees in Michigan alone and tens of millions throughout other states and Canada. Small trees can die as soon as one to two years after infestation, while larger infested trees can survive for three to four years. Heavy infestations of larval borers speed up the devastation of formerly healthy trees.

Where is it?

The emerald ash borer primarily lives in the midwestern and eastern United States and parts of Canada, but is spreading fast. For a current list of locations where EAB has been confirmed, check out the map on emeraldashborer.info.

What can you do?

Know the symptoms of EAB: thinning or dying of ash tree crowns, suckers at the base of the tree,

splitting bark, tunneling under the bark, D-shaped exit holes and woodpecker activity.

The United States Department of Agriculture (USDA) recommends the following to help manage

Record the area where you found the insect and take photos of the insect along with any damage this pest:

- Call the USDA Emerald Ash Borer Hotline at 1-866-322-4512 or your local USDA Animal and Plant Health Inspection Service (APHIS) office if you think you've found an EAB infestation. Find contact information for your local APHIS office at the USDA's website.

- Don’t move firewood from your property or carry it across state lines.
- Buy firewood from local sources and burn it where you buy it.
- Buy kiln-dried firewood.
- Before spring, burn your remaining firewood supply to eliminate the chance of EAB spreading to live trees.

For more information about possible preventative measures and potential treatments, please contact your local extension service, certified arborist or professional nursery.

Other Resources

For more information on Emerald Ash Borer, visit emeraldashborer.info.

Emerald Ash Borer

Emerald ash borer (EAB), *Agrilus planipennis* Fairmaire, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. The adult beetles nibble on ash foliage but cause little damage. The larvae (the immature stage) feed on the inner bark of ash trees, disrupting the tree's ability to transport water and nutrients. Emerald ash borer probably arrived in the United States on solid wood packing material carried in cargo ships or airplanes originating in its native Asia. **As of October 2018**, it is now found in 35 states, and the Canadian provinces of Ontario, Quebec, New Brunswick, Nova Scotia and Manitoba.

Since its discovery, EAB has:

- Killed hundreds of millions of ash trees in North America.
- Caused regulatory agencies and the USDA (https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/emerald-ash-borer) to enforce quarantines (moving-firewood.php) and fines to prevent potentially infested ash trees, logs or hardwood firewood from moving out of areas where EAB occurs.
- Cost municipalities, property owners, nursery operators and forest products industries hundreds of millions of dollars.

4th Grade Science Activity: Make a Terrarium	
Estimated Time	30-60 minutes
Grade Level Standard(s)	4.LS2.5: Analyze and interpret data about changes (land characteristics, water distribution, temperature, food, and other organisms) in the environment and describe what mechanisms organisms can use to affect their ability to survive and reproduce.
Caregiver Support Option	Help your student by guiding them through the directions.
Materials Needed	See Below.
Essential Question	How do organisms survive changes in their ecosystem?
Learning Outcome	Students will be able to gathered information to explain how organisms survive changes in their ecosystems by using structural and behavioral adaptations.

GENERATIONGENIUS
STREAM. EDUCATE. ENTERTAIN.

DIY ACTIVITY

MAKE A TERRARIUM
GRADES 3-5

OBJECTIVES

- Identify all components of an ecosystem.
- Recognize how the components of an ecosystem interact.

MATERIALS NEEDED

- Large glass jar with a lid
- Mesh
- Scissors
- Rocks or gravel
- Activated carbon (available in the aquarium section of a pet store)
- Spray bottle of water
- Plants growing in soil (choose a type of plant that needs a lot of water)
- Moss growing in soil
- Extra soil
- Spoon

PROCEDURE

1. Add a 1 inch thick layer of rocks in the jar.

2. Add a 1 inch thick layer of activated carbon over the rocks.
3. Cut a circle of mesh slightly wider than the inside of the jar.
4. Place the circle of mesh on top of the carbon.
5. Use a spoon to add a 2 inch layer of soil on top of the mesh.
6. Then, add the moss and plants.
7. Water the plants generously using the spray bottle.
8. Close the lid tightly.
9. Watch the ecosystem over time and make adjustments as necessary until the balance is just right.

WHAT IS GOING ON HERE?

A terrarium is a closed environment of plants and animals that can illustrate how an ecosystem works. With the right balance, once the jar is closed, the plant uses the water, as well sunlight and nutrients from the soil to survive. As the plant sheds leaves, they are broken down and become part of the soil, feeding the microorganisms that live there. With the right balance, the ecosystem inside the terrarium can survive for years.

FURTHER EXPLORATION

This terrarium is a wet ecosystem with moss and lots of water. Can you create a terrarium for a different type of ecosystem? Maybe one where a cactus could survive? What are the needs of a cactus? What components would you need to change.