

Science/4th Grade  
Quarter 1  
Remote Learning  
Practice and Enrichment Packet



**Answer Key**



## 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 plant growth the most? Write your hypothesis as an “If . . . , then . . . ” statement.

Sample answer: If seeds are planted in sand, soil, and gravel, then the seed planted in soil will grow the best.

#### 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.

Sample procedure for soil: Fill three plant pots halfway, one with soil, one with gravel, and one with sand. Place the same number of seeds in each pot. Place all three pots in a sunny area. Water each pot equally each day.

- 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			

- 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			

## Communicate Information

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


Sample answer: The material the seed was planted in did affect how well the seed was able to grow.

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

Sample answer: I noticed the seed that was planted in the soil grew the fastest and was healthier. The seed planted in the gravel grew the least.

3. How did this investigation support your hypothesis?

Sample answer: The results of my investigation did support my hypothesis. The seed planted in the soil grew better than the other seeds.

 **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.



## 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?

Sample answer: I think the population of rabbits will decrease if 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.

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?

Sample answer: The population of foxes also increased.

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

Sample answer: Yes, the population of rabbits decreased as the population of foxes increased.

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

Sample answer: There would be more plants as the rabbit population decreased because there are fewer rabbits eating the plants.

4. What would happen if the plant population in the forest decreased?

Sample answer: The rabbit population would decrease, causing the fox population to also decrease.



## 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?

Sample answer: emerald ash borer

2 Where is the invasive species originally from?

Sample answer: Asia

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

Sample answer: The emerald ash borer is in forest ecosystems in North America. It came in wooden packing materials from Asia.

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

Sample answer: The emerald ash borer larvae eat the inner and outer layers of bark. The damage causes the tree to be unable to transport water.

5 What other information is interesting about this invasive species?

Sample answer: The adult form only eats the leaves and doesn't hurt the trees.

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

Sample answer: The emerald ash borer larvae damage the trunk of the ash tree, causing it to die.

## 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.

Accept all reasonable answers. Drawings could include a model of a solution to the problem caused by the invasive species. Student answers may vary depending on their research.

## Communicate Information

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

Sample answer: My solution quarantines the affected trees until the invasive species dies.

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

Sample answer: People can learn not to move supplies with wood from the local ecosystem.



## ? 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.

Sample answer: The invasive species is drilling holes and carving lines into the trunk of the tree, causing it to die. If the invasive species is not removed, then the population of the trees will decrease. (The invasive species that is affecting the tree population is the emerald ash borer.)



## 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.

I did Sample answer: develop and use a model to show how living things interact in an ecosystem and how matter and energy move within an ecosystem.

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





## DIY ACTIVITY

### MAKE A TERRARIUM GRADES 3-5

#### OBJECTIVES

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

#### 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.

#### 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

#### WHAT IS GOING ON HERE?

#### KEY

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?