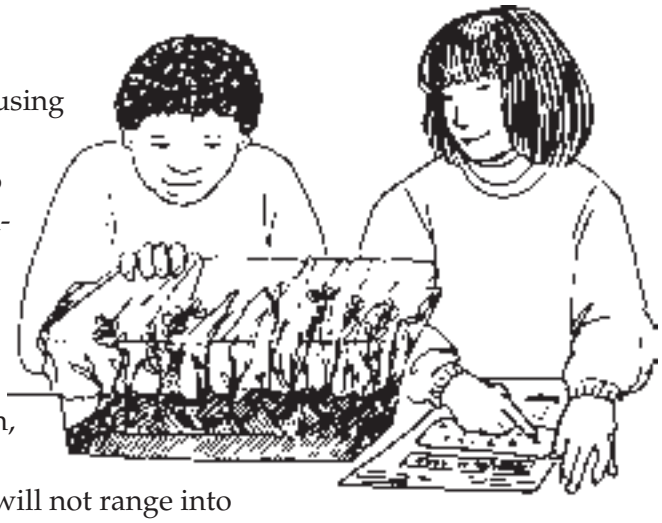
LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies.

SCIENCE NEWS



Dear Parents,

Our class is beginning a new science unit using the **FOSS Environments Module.** We will investigate several different plants and animals to discover the environments that support their well-being, and attempt to determine the optimum environments for some of the organisms.

The news is full of discussions of environment—environmental issues, environmental protection, environmental activism, and more. Environmental issues are complex because environments are complex. Our studies will not range into issues, but will deal with the more fundamental question: What is an environment?

Often environments can be analyzed in terms of the individual physical (temperature, moisture, light, etc.) and biological (other organisms) factors that surround an organism. This analysis can take time and often requires close observation and interpretation of results. We expect to work with lots of plants and animals to start understanding how organisms flourish when provided with an environment that is just right for them.

Watch for Home/School Connection sheets that I will be sending home from time to time. The activities described on them suggest ways you and your child can extend the environmental inquiry into your home, neighborhood, and community. If possible, take a family field trip to a local aquatic environment to see what lives there and to ponder the environmental factors that affect the organisms there. At another time you might set up a specialized environment in your home to raise Sea Monkeys (brine shrimp), or embark on a mini-safari, looking into microenvironments to see what insects and their kin are living nearby. Hopefully your discoveries will start some family discussions about environments.

We're looking forward to weeks of fun with organisms and their environments! If you have questions or comments, or have expertise you would like to share with the class, please drop me a note.

Comments: _____

_____

_____

_____

TERRESTRIAL ENVIRONMENTS JOURNAL

NAME

Name _____

Date _____

TERRARIUM MAP

KEY

☐ _____ ☐ _____ ☐ _____

☐ _____ ☐ _____

How much water did you put into your terrarium? _____

Where did you put it?

_____

_____

Comments

_____

_____

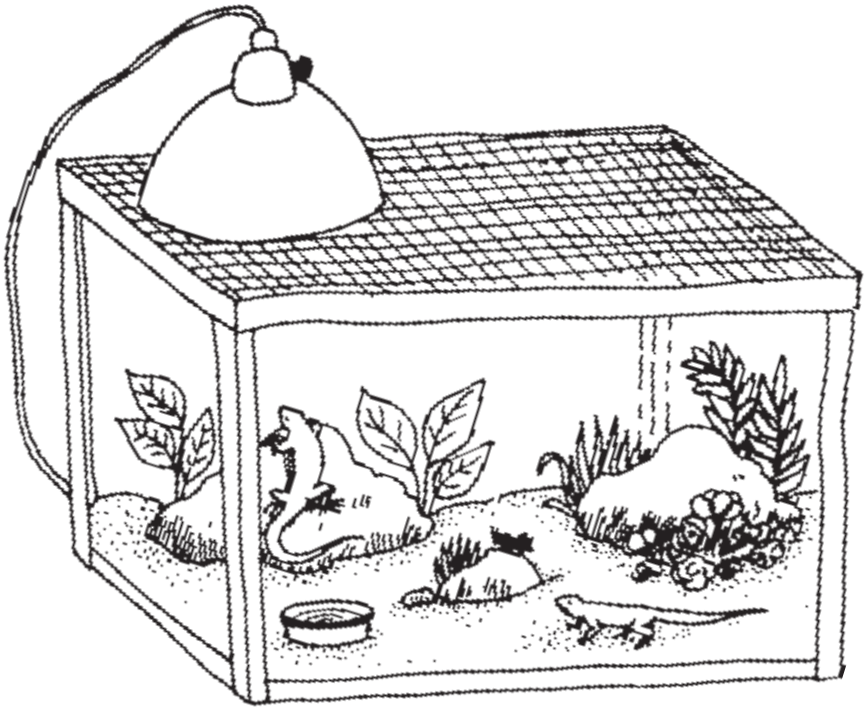
_____

Name _____

Date _____

RESPONSE SHEET

TERRESTRIAL ENVIRONMENTS



A student used the picture above to make a list of all the environmental factors she saw in this terrestrial environment. She put an *L* next to each factor she identified as a living factor. The list she made is shown below.

salamanders L
rocks
broad-leafed plants L
grassy plants L
thin-leafed plants L
flowering plants L
cricket L
pan of water
light L
glass terrarium
soil L

Do you agree or disagree with the factors she identified as living factors? Explain any items you disagree with.

_____

_____

_____

Describe how three of the nonliving factors might influence the living factors in this terrarium.

_____

_____

_____

RUNWAY CONSTRUCTION

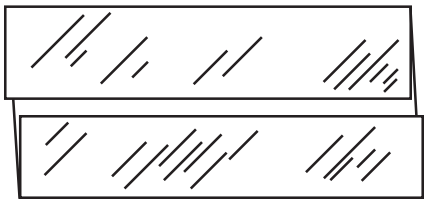
MATERIALS

1 Piece of aluminum foil, 36 cm × 46 cm
1 Strip of stiff paper, 7 cm × 28 cm
1 Metric ruler or meter tape
• Transparent tape

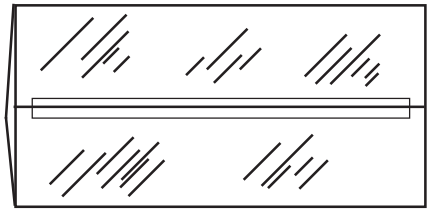
CONSTRUCTION

1. Fold the sheet of aluminum foil in half the long way and then open it up flat.

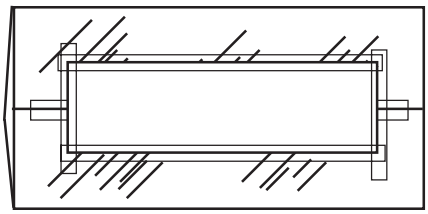
2. Fold one edge to the center line, crease the fold. Then fold the other edge to the center line, crease the fold.



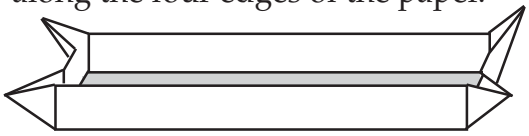
3. Tape the seam where the edges meet.



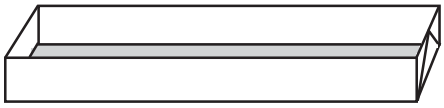
4. Place the strip of stiff paper in the center of the aluminum foil. Tape all four edges of the paper.



5. Turn the foil over so the paper is down. Fold the foil up to make walls right along the four edges of the paper.



6. Fold the triangular points at each corner flat along the ends of the runway.



Name _____

Date _____

ANIMAL INVESTIGATIONS

Animal _____ Environmental factor tested _____

Part 1. Setup

Describe how you set up the runway.

_____

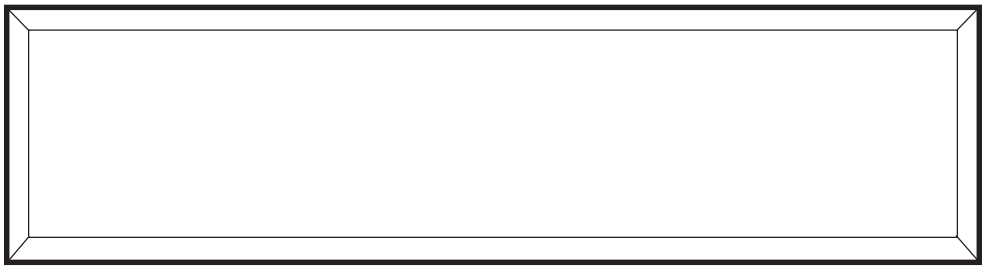
_____

_____

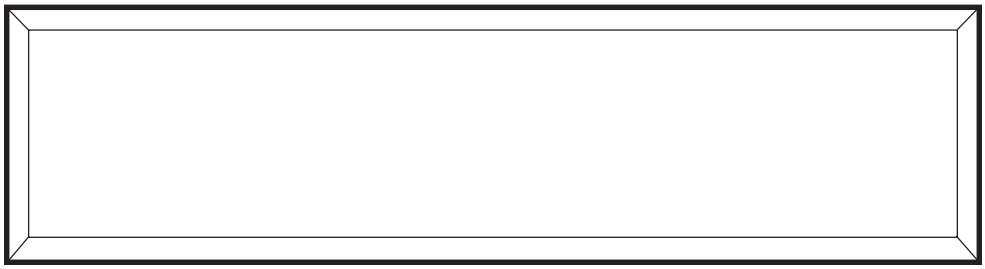
Part 2. Results

Record where each animal was and what it was doing (on surface, buried, moving).

Short run. This is where the animals were after _____ minutes.



Long run. This is where the animals were after _____ hours.



Part 3. Conclusions

What did you find out about the animals' environmental preferences?

_____

_____

_____

_____

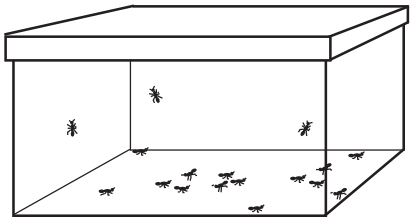
Name _____

Date _____

RESPONSE SHEET—BUGS AND BEETLES

Students in two fifth-grade classes at Evergreen School decided to study ants.
Ms. Field's students found an anthill near the playground to observe.
Ms. Glass's students observed ants in a terrarium in their classroom.

Which class chose the better method to study ants? Explain why you think so.



WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

CONTAINER LABELS

Labels for Investigation 3: Water Tolerance

MOIST
0 ml of water

WET
40 ml of water

DRY
0 ml of water

SWAMP
120 ml of water

VERY WET
80 ml of water

Labels for Investigation 5: Brine Shrimp Hatching

0 spoons of salt

1 spoon of salt

2 spoons of salt

3 spoons of salt

Labels for Investigation 6: Salt of the Earth

0 spoons of salt in 1 liter

1 spoon of salt in 1 liter

2 spoons of salt in 1 liter

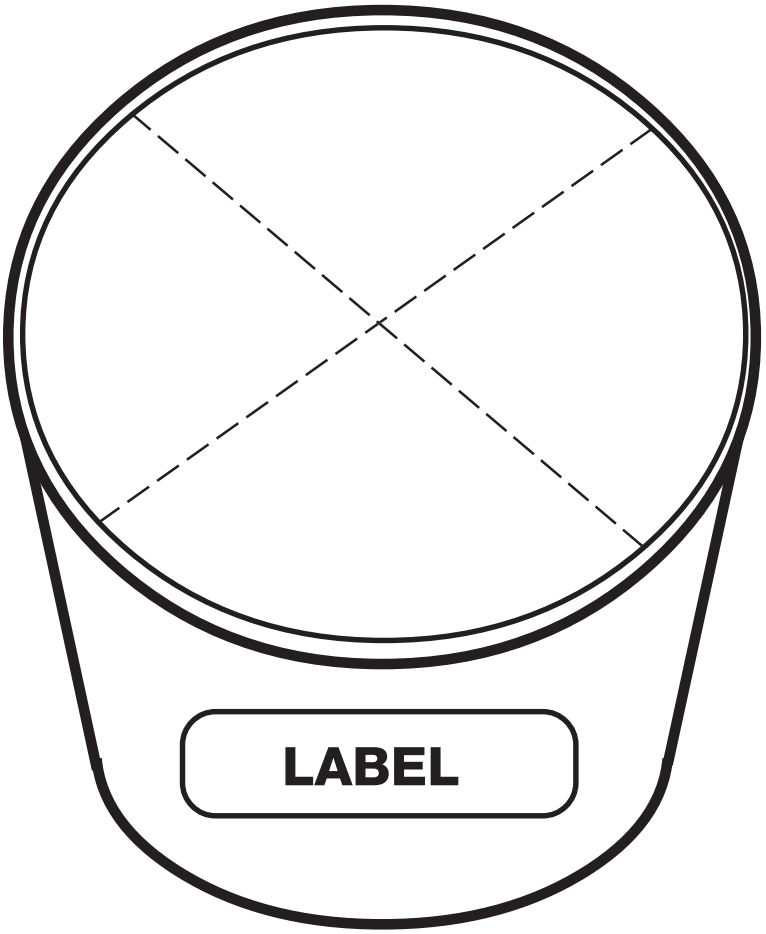
4 spoons of salt in 1 liter

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Name _____

Date _____

PLANT EXPERIMENT SETUP



Environmental factor tested

_____

Planting date _____

Number of each seed planted

Barley _____

Corn _____

Pea _____

Radish _____

Map where each seed is planted.

Plant all four containers exactly the same way.

KEY

☐ Barley ☐ Corn ☐ Pea ☐ Radish

Comments _____

_____

_____

_____

_____

_____

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

PLANT OBSERVATIONS

Name _____

Date _____

Environmental factor _____

Planting date _____

Seed type _____

Number of seeds of this kind planted _____

Part 1. Number of days after planting _____

Environment	How many plants came up	Height of tallest plant

Part 2. Number of days after planting _____

Environment	How many plants came up	Height of tallest plant	Most leaves on one plant	

Part 3. Number of days after planting _____

Environment	How many plants came up	Height of tallest plant	Most leaves on one plant	Length of longest leaf	Length of longest root	

Name _____

Date _____

RESPONSE SHEET—WATER TOLERANCE

Flora and Bunda were neighbors. Each woman bought a new rose bush on the same day. The rose bushes were exactly the same size. They also bought a watering can to share.

Every day for 3 weeks Flora put one full watering can of water on her rose bush. Every day for 3 weeks Bunda also put one full watering can of water on her rose bush AND every day for 3 weeks she added some fertilizer to the soil around the rose bush.

At the end of 3 weeks Flora's rose bush was much bigger than Bunda's. What might have caused this result?

Name _____

Date _____

PLANT PROFILE

Plant type _____ Environmental factor _____ Days of growth _____

Label the columns with the environments being studied. Tape the plants in place.

Dry				
		Shoot above		
		Root below		
		Soil		

AQUATIC ENVIRONMENTS JOURNAL

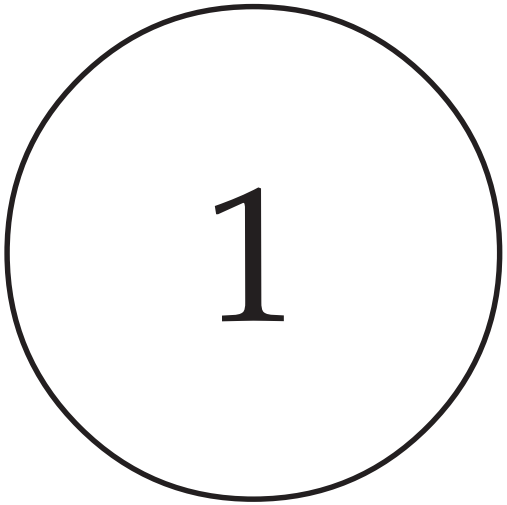
NAME

Group _____

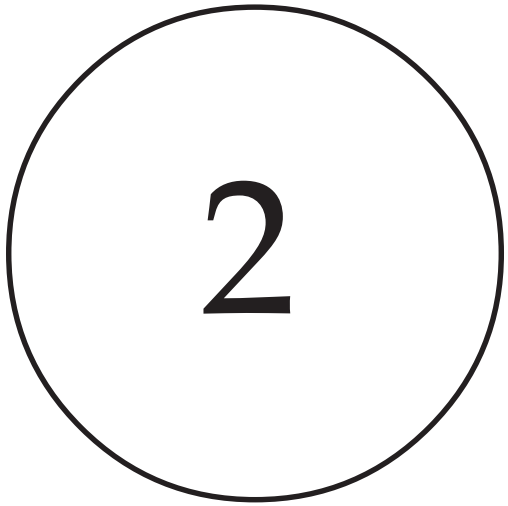
Date _____

AQUARIUM LOG

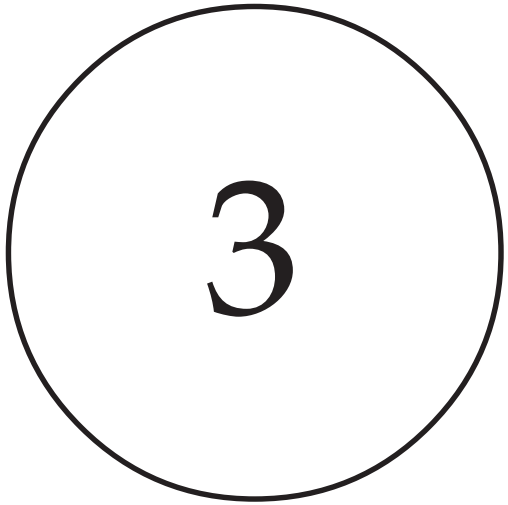
Day and date	Person responsible	Water temp.	Water level	Were the fish fed?	Observations



1 Goldfish
100 ml of water
6 drops of BTB



***Elodea* (5–10 cm)**
100 ml of water
6 drops of BTB



Nothing added
100 ml of water
6 drops of BTB

INVESTIGATIONS WITH BTB

1. Put 100 ml of aged water or bottled water in each of three cups.
2. Add 6 drops of BTB to the water in each cup.
3. Swirl the cups gently and note the color.
4. Add a goldfish to cup 1, a piece of *Elodea* to cup 2, and nothing to cup 3.
5. Wait 30 to 40 minutes and observe the colors.

Name _____

Date _____

RESPONSE SHEET—AQUATIC ENVIRONMENTS

Charlotte wrote in her journal,

Today we put a few drops of BTB in a cup of water. Then we put a fish in the water. After 20 minutes I noticed that the water had turned from blue to yellow. We think if we put a tadpole or crayfish in water containing BTB it would turn yellow in 20 minutes, too.

Do you agree or disagree? Explain your thinking.

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Name _____

Date _____

BRINE SHRIMP HATCHING

PART 1

What day of your experiment did you first notice hatching?
(Count setup day as day 1.)

☐ Day 1 ☐ Day 2 ☐ Day 3 ☐ Day 4

In which container did you first observe hatching?

☐ 0 spoons ☐ 1 spoon ☐ 2 spoons ☐ 3 spoons

What additional observations did you make?

_____

_____

_____

_____

PART 2

Record the number of eggs that hatched in each salt condition.
Make an X in one box for each salt condition.

Day _____ (Count setup day as day 1.)

SALT CONDITIONS

	0 SPOONS	1 SPOON	2 SPOONS	3 SPOONS
MOST				
SOME				
NONE				

Name _____

Date _____

RESPONSE SHEET—BRINE SHRIMP HATCHING

Terry wanted to hatch some brine shrimp. He went to a pet store and bought some brine shrimp eggs. Terry had heard that brine shrimp eggs hatch when they are in salt water, so he put some water in a bowl, dumped in a bunch of salt, and put the brine shrimp eggs into the salted water.

After 3 days the brine shrimp eggs had not hatched. Terry concluded that the eggs he got at the pet store were dead. Do you agree with Terry's conclusion? Explain what Terry could do to get the brine shrimp eggs to hatch.

Name _____

Date _____

RESPONSE SHEET—SALT OF THE EARTH

Here is a chance for you to help scientists solve a problem. Mike and Mary are two scientists who travel up small streams that flow into the large Amazon River in South America. They study the plants and animals along the streams. As they travel upstream, they usually find that the number of insects around them increases. When they are near the headwaters where the streams begin, they expect to be surrounded by swarms of insects.

One day they traveled up a stream they had not been on before. As they got nearer to the source of the stream, the number of insects declined until there were almost none at the headwaters. The scientists were puzzled. List some ideas you have that might explain why this one stream had fewer insects near its source.

Name _____

Date _____

PROJECT IDEAS

- Bring in a terrarium from home. Describe what type of environment it is and how you care for it.
- Bring in your own bug collection. In your presentation be ready to talk about the types of bugs in the collection and their natural environment.
- Prepare a presentation about an aquarium you keep at home. Tell the class about the different kinds of fish in the aquarium and how you care for them and their aquatic environment.
- Bring in a plant you've grown and describe its optimum conditions.
- Design a native-plant garden for your school, map it, and present the design to your principal.
- Write a letter to a botanical garden requesting information on native-plant species in your community. Prepare samples if possible or use drawings to present information to the class.
- Ask a local nursery or botanical garden what types of nonnative plant species do well in your climate and why.
- Contact Adopt an Acre of Rainforest. Present the information to the class and organize a fund drive.
- Find out about other Adopt a... (watershed, a creek, etc.) and see how you can get the class involved.
- What does the Department of Agriculture do? Find out more about farming in the U.S.
- Find out about your county's agriculture department or land-management department. What is its function?
- Research the natural resources department in your area. Does it help protect the native-plant species in your area?
- Survey your neighborhood gardens and prepare a presentation on which plants seem to do the best and why.
- Survey the pets that live in your neighborhood. How are their environmental preferences accommodated?
- Research an environment from another part of the world. Present findings on how the nonliving factors influence the living factors in the environment.
- Research a favorite living organism. Discuss the preferred environment or optimum conditions for that species.
- Find out more about saltwater environments such as the Great Salt Lake, Mono Lake, or a salt pond. What types of organisms prefer this kind of environment?
- Find out more about how pollution from farming and other industries affects their surrounding environments.
- Research a cleanup effort for a polluted river or other aquatic environment. Find out if it was successful and why.
- How does the extraction of natural resources affect the environment?
- Prepare a planting instruction booklet for the plant you became an expert on.
- Design an environment for an imaginary animal.
- Research beetles and write a short story or a poem about them.
- Write a public-service advertisement urging people to protect the environment.

NOTE: You may collect and analyze information for your project using sound recorders, computer research, and cameras.

Name _____

Date _____

PROJECT PROPOSAL

1. What is the question or the project that you are proposing?

2. What materials or references will you need to complete the project?

3. What steps will you follow to complete the project?

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking, you will see the *green card* held up for 2 1/2 minutes. When you see the *yellow card,* you have 30 seconds left. When you see the *red card,* it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking, you will see the *green card* held up for 2 1/2 minutes. When you see the *yellow card,* you have 30 seconds left. When you see the *red card,* it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 1: TERRESTRIAL ENVIRONMENTS

Eric, Jose, Shannon, and Jackie wanted to plant a garden. Jose's dad said they could use a rectangular space in the backyard that was 8 m by 4 m.

The friends decided they would first like to make a colorful border for the garden using small flowering plants called marigolds.

If they planted the marigold plants 10 cm apart, how many would they need to complete the border? Show all your work.

The four friends decided to divide the 8 m by 4 m garden into four plots with equal areas so each could plant his or her own little garden. What size plot will each of the four friends get? Describe at least two possibilities. Show your work, including drawings if you like.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: BUGS AND BEETLES

Josh is building a wooden box for a darkling beetle habitat. If the area of the bottom of the box is 576 cm^2 and the shortest side is longer than 10 cm, what are all the possible length and width combinations? Note: Josh measures the sides of his habitat box in whole numbers, not fractions.

When Josh completes the box, the sides are 12 cm high. How much soil will it hold? Show all your work.

Allison is making an unusual ladybug habitat—it has five equal sides. What is this shape called?

The distance from one corner to the next is 28 cm. What is the perimeter of the container? Show all your work.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 3: WATER TOLERANCE

Mr. Crawford's class is setting up a water-tolerance investigation. Each group needs 40 ml of water to make wet soil and 80 ml to make very wet soil. There are eight groups in the class. How much water is needed? Show your work.

If the water evaporates at the rate of 10% a day, how much water will have evaporated in 5 days in each container? Round all calculations to the nearest tenth (.1).

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 4: AQUATIC ENVIRONMENTS

Kim set up a tropical-fish aquarium. She had $20.00 to spend on fish. She bought at least one of each of the fish listed below, and had less than $2.00 left over. What combination of fish did she buy?

neon tetras	$ 1.25	2 cm long
angel fish	$ 3.95	7 cm long
lampeye	$ 1.59	3 cm long
mollies	$ 2.00	4 cm long

Show all your work.

Kim's parents agreed to buy an aquarium tank for Kim's fish. Kim remembered from her aquatic-environments investigation that tropical fish require 1 liter of water for every 3 cm of fish length in the aquarium. What size aquarium (in liters) should Kim ask for? Show all your work.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 5: BRINE SHRIMP HATCHING

Maria set up a series of six brine shrimp experiments to discover the optimum salt concentration for hatching. She used 1 liter of water in each container, and 1 little spoonful of brine shrimp eggs. She put a different amount of salt in each container, following this formula.

In container 1 Maria put 8 spoons of salt.
In container 2 she put half as much salt as she put in container 1.
In container 3 she put half as much salt as she put in container 2.
In container 4 she put half as much salt as she put in container 3.
In container 5 she put half as much salt as she put in container 4.
In container 6 she put half as much salt as she put in container 5.

How much salt did Maria need to set up her six containers? Show your work.
Use drawings if you want to.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 6: SALT OF THE EARTH

Bert needed water for his cabbage garden, so he built a spring box in the hillside above his home. He ran a pipe from the top of his spring box to his garden. As soon as water filled the spring box, it would start to flow to Bert's garden, but not until water reached the top of the spring box.

Bert watched anxiously for water to start to flow. He observed that the water came up 5 cm in the spring box each night, but the water level went down 3 cm during the day.

Bert's spring box is 20 cm from the bottom to the top where the pipe is attached.

On what day (or night) will water first flow to Bert's cabbages? Show your work. Use drawings if you want to.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 1: TERRESTRIAL ENVIRONMENTS

Make a list of the living and nonliving environmental factors found in and around your home.

Living	Nonliving

Discuss the list with a family member. Do they agree? Select one item you disagree on and write a brief explanation telling why you think the environmental factor is living or nonliving.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 2: BUGS AND BEETLES

Insects live just about everywhere. Go on a safari in and around your home or into the neighborhood to look for insects. Hopefully you will discover insects that are fun and interesting to observe, like butterflies, bees, moths, grasshoppers, and ladybugs. On the other hand you could see less welcome insects like ants, flies, mosquitos, and roaches.

You might also encounter some small animals that are not insects, but live in the same environments, like centipedes, millipedes, isopods, spiders, and worms.

Safety Note: While most insects, spiders, and other small animals are harmless, some can sting (ants, wasps, bees), and some can bite (spiders, centipedes, and others). Observe the animals without touching them (for your safety) and without disturbing them (for their safety and well-being.)

Organize the results of your safari one of two ways.

- If you find only one or two critters, identify them and describe their environments as thoroughly as you can. Try to identify both living and nonliving factors in the organisms' environments.

- If you go to an environment and find a number of insects and their kin living there, write a description of the environment (e.g. dark, moist, cool environment) and then list (or draw) all the different animals living there.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 3: WATER TOLERANCE

Where is the optimum environment for growing a plant in your home? That's not an easy question to answer. It seems logical to assume that a fern and a cactus would find optimum conditions in different places, but how would you find out for sure? Conduct an experiment.

Set up three identical cups, supply each with the same amount of soil, plant the same number of seeds, water them all the same, *but* place them in three different locations. Then let the plants indicate which environment is optimum.

Materials

- 3 Paper or plastic cups
- 9 Seeds (all the same type) **or**
- 3 Small plants of the same kind
- Soil (same amount for each cup)
- Water (same amount for each cup)

My experimental plant (seed) is _____

The three different environments I selected for my plants are

Environment 1 _____

Environment 2 _____

Environment 3 _____

After 3 or 4 weeks record what happened to the three plants and describe the environment that you determined to be optimum for your plants.

_____

_____

_____

_____

_____

_____

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 4: AQUATIC ENVIRONMENTS

Aquatic environments are home to fascinating and diverse organisms. Aquatic systems can be as grand as a lake or ocean, or as ordinary as a mud puddle or neglected bucket of water. If you have the opportunity, visit an aquatic environment, like a beach, pond, stream, or canal. Use a collecting net to see what plants and animals are living in, on, and near the water. Draw pictures to share with the rest of your class.

If that is not possible, search around your home and neighborhood for mini aquatic systems, like puddles, gutters with standing water, or buckets left out to fill with water. Get down close and look carefully. Maybe scoop some water into a white-bottomed container like half of a milk carton or a plastic bowl.

Describe how one plant or animal is influenced by a **nonliving** factor in the aquatic environment.

Describe how one plant or animal is influenced by a **living** factor in the aquatic environment.

Describe an example of environmental preferences that you observed in the aquatic environment.

If no natural aquatic environments are conveniently at hand, get a map of the area in which you live. Locate the aquatic environments nearby. Make lists of them, organizing them into groups based on the specific kind of aquatic environments you locate: stream environments, lake environments, and so forth. Use the reverse side of this paper to make your lists.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 5: BRINE SHRIMP HATCHING

Sea Monkeys Unveiled!

The novelty critters advertised as Sea Monkeys in the back of some popular comic books and magazines are actually brine shrimp. You now know the optimum concentration of salt for hatching the brine shrimp eggs, but what is the proper environment to keep them alive and growing? Read on.

In their natural environment, which is salt lakes (like the Great Salt Lake or Mono Lake) or ocean bays (like San Francisco Bay), the mix of salts is fairly complex—certainly more complex than just table salt in water. Biologists who study brine shrimp have come up with a recipe for a more complete saltwater environment for the shrimp.

English units using measuring cup and teaspoon (1 teaspoon is about 5 ml)

1 quart	pure water
1/4 cup	rock salt (or other non-iodized salt)
1-1/2 teaspoons	Epsom salts
3/4 teaspoons	baking soda

Metric units using liter beaker and metric measuring spoons

1 liter pure water
60 ml rock salt (or other non-iodized salt)
8 ml Epsom salts
4 ml baking soda

Stir up this brew and let it sit in a container, like a cutoff 2-liter soda bottle, for a day or so to mellow. After the brine shrimp hatch, dump them into the new environment, hatching water and all.

Mark the water level with a piece of tape or a permanent pen mark. As the sea level goes down (evaporation), bring back to starting level by adding plain water. Why plain water? Only the water evaporates, not the salts. If you renewed the level with saltwater, soon the salt concentration would be too great for the brine shrimp to live.

You can keep the colony in a sunny window. They will need to eat, so you should dissolve a tiny pinch (I do mean a very little bit) of yeast in a little water, and pour the solution into the brine shrimp container. Give the whole business a stir to distribute the yeast throughout the environment.

Good luck. But don't expect your Sea Monkeys to hang by their tails or eat bananas—as you now know, they are aquatic crustaceans, not arboreal mammals.