

STRUCTURES OF LIFE

PROJECT IDEAS

- Draw Venn diagrams to sort the seeds by many different properties.
- Seeds can move away (disperse) from the parent plant to find a more suitable place to grow. Collect seeds from your yard or neighborhood and try to discover how each type of seed might be dispersed.
- Plant seeds in a milk-carton planter box. Use the seeds discovered in fruits or found outside.
- Grow your own sprouts or bring in a variety of sprouts from the grocery store. Conduct a taste test of the sprouts from the store.
- Investigate other conditions for germination, such as putting one minisprouter in a refrigerator and one in a warm area, or the need for light. Do older plants (not seeds) need the same conditions?
- Collect a variety of flowers to dissect. Research the parts of a flower, then look for the variations of flower structures among different plants.
- Plant bush bean seedlings in soil to compare with the hydroponically grown plants.
- How much *Elodea* will your crayfish need for a month? Record the total length of *Elodea* placed in the tray, and measure again a day (or more) later. Sometimes it will be necessary to measure lots of little pieces if the crayfish chop it up as they eat it. Predict how much will be needed for a month.
- Propose food sources for the crayfish and test their acceptability to the crayfish. Remember, always offer protein-based foods in a separate feeding container for short periods of time.
- Investigate crayfish territory.
 - a. Is the territory influenced by the houses? Remove them to see if the crayfish maintain their territories.
 - b. Is the territory influenced by the way the tray lines up north and south?
 - c. Rotate the tray 180 degrees.
 - d. Is the territory influenced by the closeness of other crayfish? Move the houses all to one end of the tray.
 - e. Is the territory influenced by other organisms in the habitat? Put aquatic snails or guppies in the habitat and observe the results.
- Use a Venn diagram to compare land snails to slugs, another member of the class of gastropods. All gastropods are in the phylum of mollusks. Or compare land snails to another member of the mollusk phylum, such as clams or octopuses.
- Research the classification system of animals or plants that defines various phyla, classes, and orders of organisms by their structures.
- What will a snail eat? Stay away from experimenting with any salty or oily foods, as they are harmful. Stick with vegetables, fruits, and fungi.
- Investigate the snail's preferences for wet or dry environments. Set up one habitat with a dry, sandy side and a side with moist soil. A piece of cardboard in the middle will help divide the habitat.

MATH EXTENSION—PROBLEM OF THE WEEK
.....**INVESTIGATION 1: ORIGIN OF SEEDS**

Ray and Sandy were in charge of snacks for the math-club party. They decided to make a nut mix. (Did you know nuts are the seeds of trees and shrubs?) They made small samples of three nut mixes. Each nut mix included peanuts, almonds, and cashews.

Can you figure out how many of each kind of nut they put into each sample?

NUT MIX #1

There are 3 peanuts.

There are three times as many cashews as peanuts.

The total number of nuts is 15.

NUT MIX #2

There are twice as many cashews as almonds.

There are twice as many almonds as peanuts.

There are 12 cashews.

NUT MIX #3

The peanuts and almonds add up to 11.

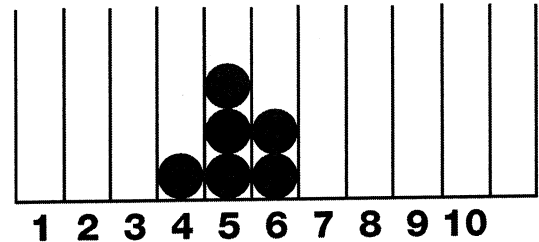
There are three times more peanuts than cashews.

The total number of nuts is 14.

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: GROWING FURTHER

Willie's class had one bean. They planted it, and six bean pods grew on their bean plant. They counted the beans in each pod and made a histogram.



1. What was the most common number of seeds they found in their pods?
2. What was the total number of seeds their plant produced?

Next year Willie's class is going to plant all the seeds. They predict that the average number of seeds in each pod will be five.

3. If **ten of them grow** into bean plants, how many seeds will the plants produce?

☐

Close to 50

☐

Close to 100

☐

Close to 300

Write a letter to Willie. Tell him how many seeds his plants might produce next year. Explain how you solved the problem.

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 3: MEET THE CRAYFISH

Your class has teamed up with a class in North Dakota as FOSS website penpals. The North Dakota class just finished recording the movements of their four crayfish in their habitat for 2 weeks. Below is the data they collected and sent. But, as you can see, the data are not well organized. Your job is to reorganize the data to see if you can predict where each of the North Dakota crayfish will be on Monday.

The crayfish are named Speedy, Tiny, Rosie, and Flipper.

The four houses are coded with geometric shapes, ●, ▲, ■, and ▬.

Day 1	Rosie	●	Speedy	▲	Tiny	■	Flipper	▬
Day 2	Tiny	▬	Speedy	▲	Flipper	■	Rosie	●
Day 3	Rosie	▬	Flipper	●	Speedy	▲	Tiny	■
Day 4	Speedy	●	Rosie	▲	Tiny	▬	Flipper	■
Day 5	Flipper	■	Tiny	●	Rosie	▬	Speedy	▲
Day 6	Rosie	▬	Speedy	▲	Flipper	■	Tiny	●
Day 7	Tiny	■	Speedy	●	Flipper	▬	Rosie	▲
Day 8	Rosie	▲	Flipper	■	Speedy	●	Tiny	▬
Day 9	Speedy	●	Rosie	▲	Tiny	▬	Flipper	■
Day 10	Flipper	■	Tiny	▬	Rosie	▲	Speedy	●

1. Reorganize the crayfish information in a more useful chart.
2. Make bar graphs of the data.
3. Predict in which house each crayfish will be on Monday and explain why you think so.

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 4: MEET THE LAND SNAIL

Explorers just discovered a new animal in the forests of the Amazon River! Never before has anyone in the world seen this organism. They have e-mailed the following information to your class. How do you think the crail looks?

Feet: In 9 jumps, you can make 18 footprints.

(In a jump, all the feet touch the ground.)

The crail can make 27 footprints.

Legs: The crail's legs are half as long as its tail.

Length: The crail's body is three times longer than its head.

The crail's tail is twice as long as its body.

Toes: You have an even number of toes.

The crail has an odd number of toes.

The crail has more toes than you do.

Eyes: The crail has the same number of eyes as you do.

Head: Your head is rather like a circle.

The crail's head is more like a rectangle.

The crail's ears are the shape of pyramids.

Habitat: A crail can hide underwater for hours.

That's why no one has ever seen it before.

It can stay there because its nose is twice as long as its leg.

1. Draw what you think the crail might look like. Use your imagination! All crails have to fit the description above.
2. Explain how you figured out what the crail looks like.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 1: ORIGIN OF SEEDS

Where there are plants, there are seeds. Take a family excursion around the block or to a park, and look for seeds. Weeds are notorious for producing lots of seeds—that's one reason they are so successful.

Make a seed collection. Stick a few seeds in the spaces on this sheet with a drop of glue or a bit of tape. If you know the name of the plant the seed came from, write it in the space above the seed.

Look at each seed and try to figure out how it might move from the parent plant to a new location to grow.

Look for seeds in fruits that you eat. Stick a food seed on the sheet, too.

SEED COLLECTION

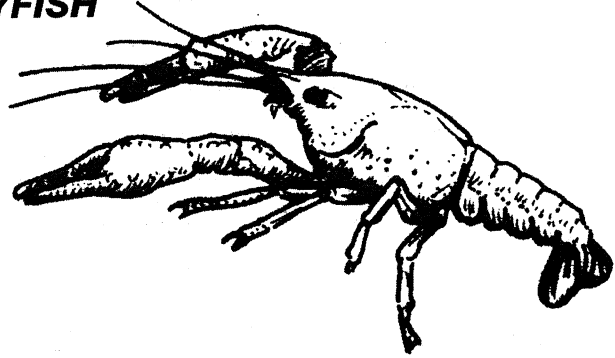
SAFETY NOTE: Although most plants are harmless, some can cause allergic reactions. Use care to select your seeds. Don't eat anything you collect, and wash your hands after handling the seeds or plants.

INVESTIGATION 2: GROWING FURTHER

HOME/SCHOOL CONNECTION

INVESTIGATION 3: MEET THE CRAYFISH

The kingdom of animals is subdivided into a handful of groups called phyla. All the animals in a phylum share fundamental similarities. For instance, humans are in the same phylum (Chordata) with the other mammals, birds, and snakes because all have backbones.



Crayfish are in the phylum Arthropoda. The name means jointed legs. Arthropods include crayfish, crabs, shrimps, scorpions, spiders, centipedes, and insects. The most common arthropods on Earth are insects. You should be able to find one (or several) insects to compare to the crayfish we have been studying in class. You may need a hand lens to look closely.

Safety note: While most insects and insect relatives are harmless, some can sting (bees, wasps, ants), and some can bite (spiders, centipedes). Observe closely without touching.

- A large, live insect is best if you can corral one for a while in a jar. You might be able to catch a cricket, roach, or grasshopper.
- Look on window sills or in light fixtures for dead insects.
- Find a small insect (or their kin) under a rock or in some other hiding place: an ant, spider, isopod, beetle, or other live critter.
- Remember to return the live insects to their habitat after you observe them.

	CRAYFISH	INSECT
How many legs?		
How many antennae?		
How many eyes?		
What kind of tail?		
How many wings?		
What kind of mouth?		
How many leg joints?		

Discuss with your family how these structures help the crayfish and insect survive.