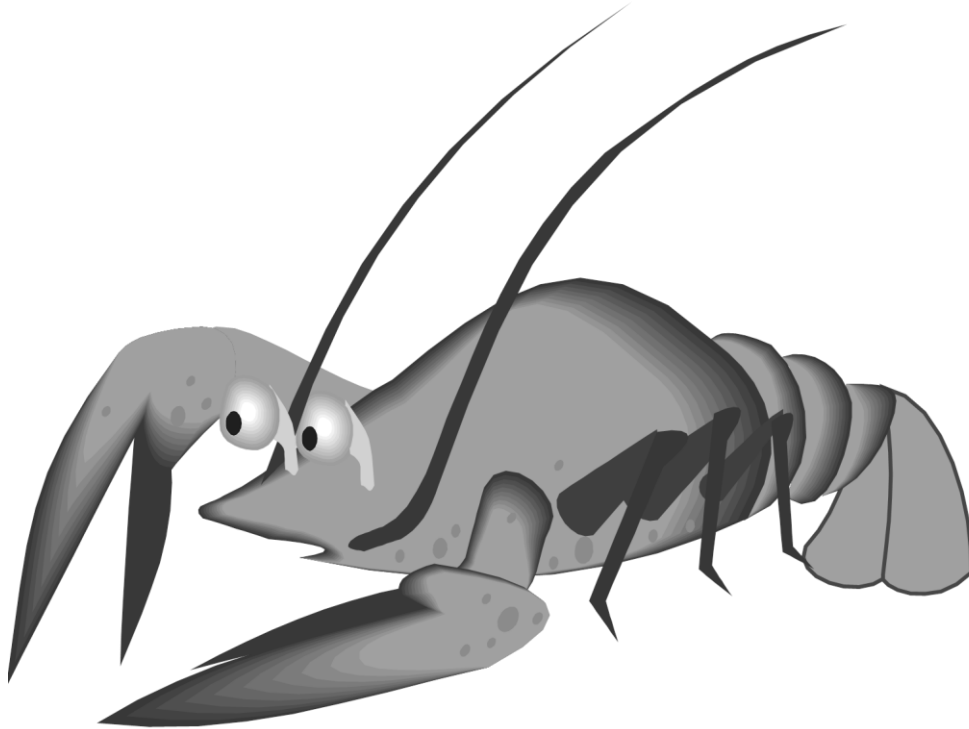


Animal Responses



Student Science Journal

**You are going to learn how animals
respond when their surroundings change.**

What do animals do if it gets cold?

How do animals react to sunlight?

Do animals prefer salt water or fresh water?

The way animals respond may help them survive.

What do you think?

Student Zoologist _____

Revised Mar 2016 (format, graphics, phrasing)

Activity 1: What is a mealworm?

Carefully observe your mealworm with a hand lens and draw it. Label the head, thorax, and abdomen. Label the antenna, mouth, and eye. Label the legs.

1. How many segments does your mealworm have? _____
2. How many legs does your mealworm have? _____
3. Where are the bristles? _____
4. How do you think the mealworm senses the environment?

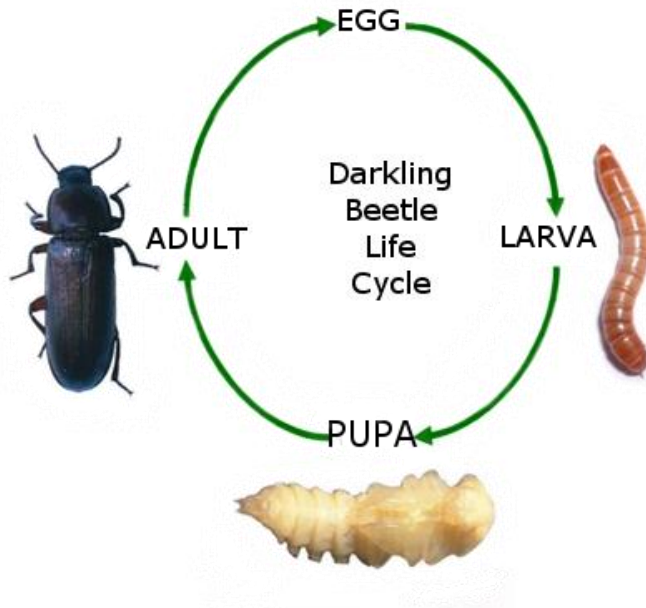
Life Cycle of a Mealworm:

There are 4 stages in the life cycle of a mealworm.

- **Egg:** The eggs are white, oval shaped and about 1-1.5 mm long. They are covered with a sticky substance that causes them to be coated with foreign matter. The egg hatches in 1-2 weeks.
- **Larva:** After the eggs hatch, the larva are capable of eating immediately. As the whitish larva grow, they shed their skins up to twenty times and become a darker yellowish-brown. When full grown, mealworms are about 2.5 cm long and 3 mm in diameter. This stage lasts 4-5 months.
- **Pupa:** The pupal stage follows the larval stage. The pupal (one pupa, two pupae) are whitish and slowly turn yellowish brown. Pupae are inactive, but will react to being touched by flipping the hind segments back and forth. The pupal stage lasts up to 3 weeks.

- **Adult:** Adult beetles are completely white, turning darker over a few days. The adult has wings but cannot fly. A female beetle may lay up to 500 eggs.

This pattern of development (egg, larva, pupa, adult) is complete metamorphosis. The entire process takes about 6-7 months.



Fill in as many dates of your mealworm’s life cycle as you can.

Date

Adult lays eggs ?

Larva emerges ?

Today’s date _____

Pupa forms _____

Adult emerges _____

Adult lays eggs _____

Activity 2: How do we keep mealworms healthy?

Food:

1. Draw perpendicular lines on a piece of white paper.
2. Put a mark on the lines, 2 inches from the intersection.
3. Put the paper on the bottom of a shoe box
4. Choose 4 different kinds of food (cereal, grass, meat, fruit) that a mealworm might eat. Put the food on the lines, 2 inches from the intersection.
5. Put 5 mealworms on the intersection of the two lines.
6. Cover the box
7. Check the location of the mealworms after 5 minutes.
8. Repeat the experiment

Which food did the mealworms prefer? _____

Moisture:

Put a moist paper towel on one side of a shoebox and a dry paper towel on the other side of a shoebox. Put 5 mealworms between the 2 paper towels. Cover the box. Wait 5 minutes. Do the mealworms prefer the moist towel or the dry towel? Repeat the experiment.

Moist _____ No Response _____ Dry _____

Light:

Put 5 mealworms in the middle of a shoebox. Cover half of the shoebox. Do the mealworms prefer a light or dark environment? Repeat the experiment.

Light _____ No Response _____ Dark _____

Conclusions: How did mealworms respond to:

Food _____

Moisture _____

Light _____

Activity 3: How do mealworms respond to changes in the environment?

Vinegar:

When testing the mealworm's response to vinegar, put 2 drops on a cotton swab and then hold the swab near the mealworm. How does the mealworm respond? (moved away, moved toward, no response) Repeat test 5 times.

Touch:

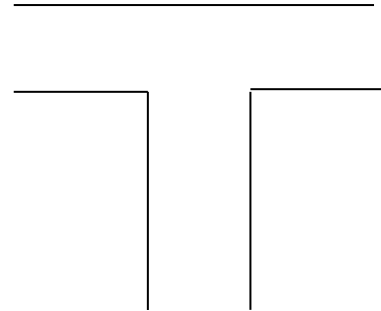
When testing the mealworm's response to touch, lightly touch the mealworm with a pencil? How does the mealworm respond? (moved away, moved toward, no response) Repeat test 5 times.

Light: (testing in a different way than Act. 2))

When testing the mealworm's response to light, shine a flashlight on its eyes. How does the mealworm respond? (moved away, moved toward, no response) Repeat the test 5 times.

T- Maze:

Make a maze that looks like a "T".
Use masking tape and stiff paper (use the "Manilla folder strips").
The sides of the maze should be 5 cm high.
The path should be 5 cm wide. Place the masking tape on the outside of the maze.



Place the mealworm at an open arm of the maze, this is the start.

Which way did the mealworm move? _____

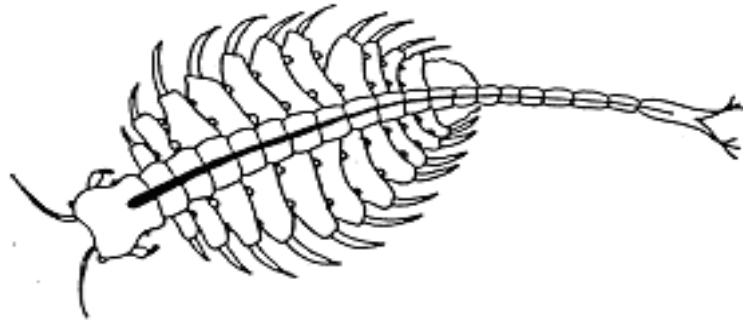
Repeat test 5 times. What were the results? _____

Why do you think so? _____

Activity 4: What are Brine Shrimp?

Brine shrimp are small arthropods that live in salty water. They eat micro-algae, bacteria and detritus (dead plants and animals).

This is what a brine shrimp looks like.



1. How do you think a brine shrimp can learn about its surroundings? _____ and _____
2. What is brine? _____
3. What happened when water was added to the brine shrimp egg mix? _____ and _____
4. How long did it take for the eggs to hatch? _____
5. Why did the brine shrimp swim from the salt water into the fresh water?

Activity 6: How do brine shrimp respond to a change in the environment?

Directions:

- 1. Design an experiment to test the response of brine shrimp to a change in acidity (vinegar).**
- 2. Observe the responses of the brine shrimp to a change in acidity.**
- 3. Repeat the experiment to check the results. Are they the same?**
- 4. Report the results to the rest of the class.**

Write about your experiment – what you did, what you observed, problems you experienced.

Activity 7: What is a crayfish?

Facts about crayfish:

1. Crayfish live in freshwater streams, ponds, and lakes.
2. Crayfish have an exoskeleton, like its relative, the lobster. The front of the exoskeleton is called the carapace; the rear portion has a series of 6 joints.
3. Crayfish have 5 pairs of legs. 2 large legs are claws and 8 legs are for walking.
4. 5 pairs of swimmerets are under the abdomen.
5. Crayfish have 17 pairs of gills.
6. Crayfish have 2 compound eyes located on stalks
7. Crayfish have 2 antennae to detect rocks.
8. Crayfish have 4 antennules that “smell” the water and help locate food.
9. Females lay about 200 eggs that stay attached to her under her abdomen.
10. Baby crayfish leave the mother after one month.
11. Crayfish grow about .5 inches a year.
12. A crayfish molts or sheds its skin.
13. A crayfish is mostly nocturnal.
14. Crayfish are eaten by bullfrogs, fish, water snakes, muskrats and raccoons.
15. It takes a crayfish an hour to eat a minnow.

Most crayfish do not get old. Predators eat some, pollution kills some, shifting rocks kill some. Life is not easy for a crayfish living in a stream.

Crayfish living in a classroom have different problems than crayfish in the wild.

What are problems for crayfish living in your classroom?

1. _____

2. _____

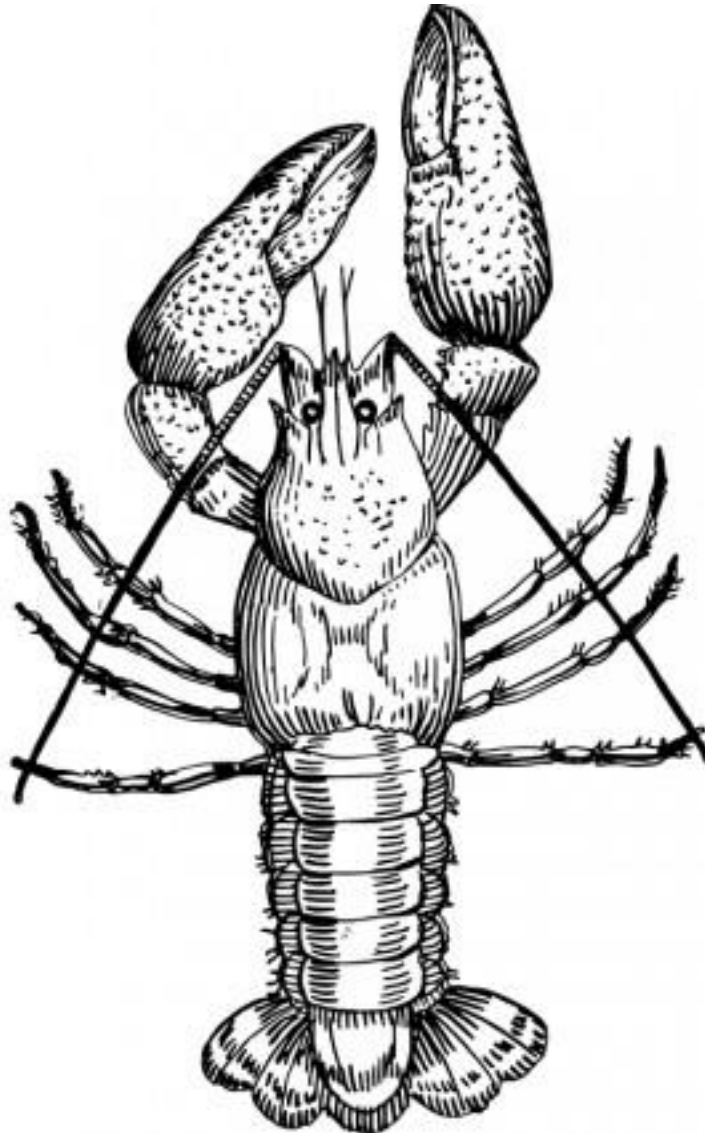
3. _____

Have you found crayfish before? _____

Did they pinch you? _____

Label the parts of the crayfish.

antenna	claw	abdomen
antennules	head	walking legs
compound eye	thorax	telson (last segment of abdomen)



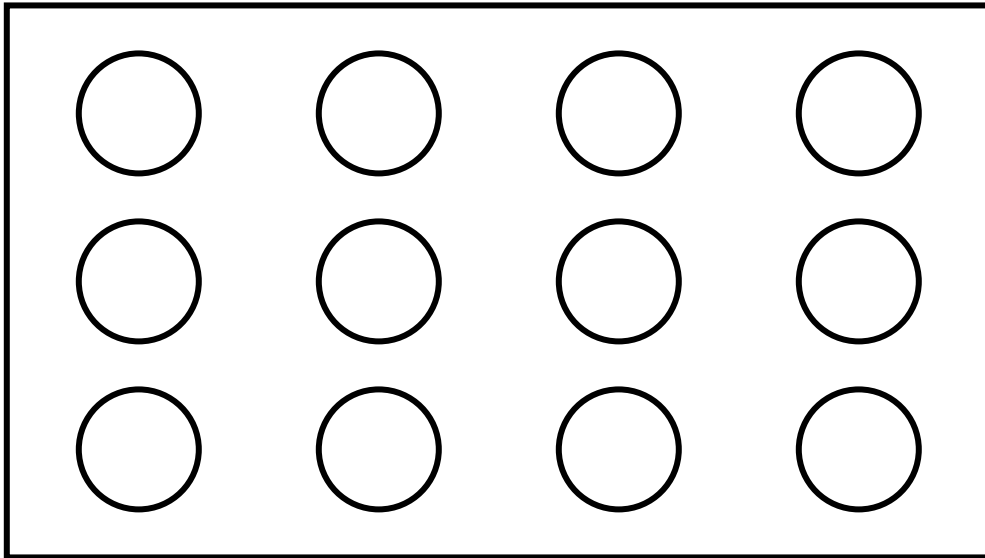
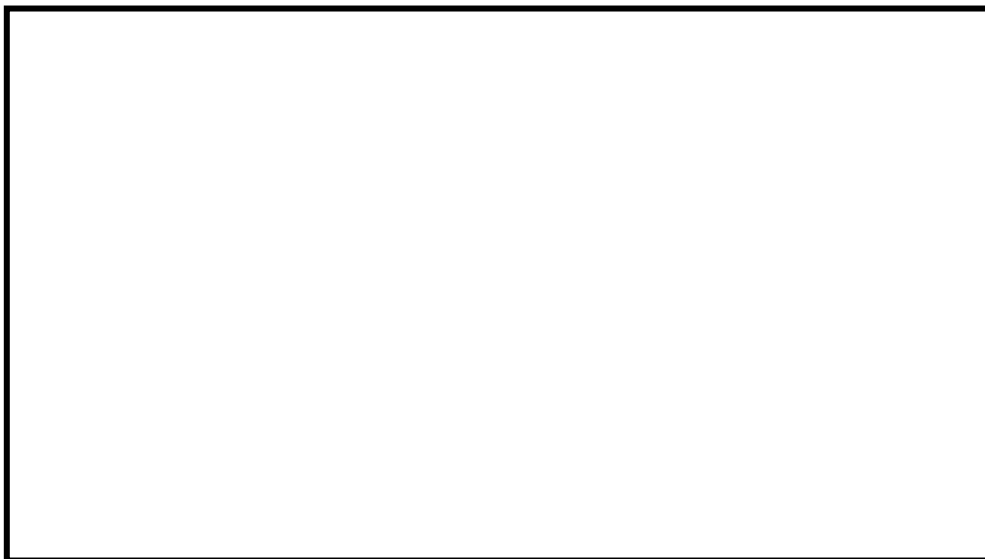
There are many variations of crayfish. This diagram may not look exactly like your crayfish but has common characteristics.

Activity 8: How do we keep the crayfish healthy?

To stay healthy, a crayfish needs food, oxygen and shelter. The flowerpots provide shelter for the crayfish.

Map the tub and the location each crayfish and pot in the afternoon and do it again the next morning.

Number the pots (p-1, p-2, etc) and the crayfish (m-1, m-2, and f-1, f-2, etc).

Afternoon**Morning**

Activity 9: What do crayfish eat?

Crayfish live in a stream and hide under rocks during the day. At night they prowl around and search for dead animals (fish, tadpoles, insects), dead plants, living animals and living plants. Crayfish are herbivores, carnivores, and scavengers. They remove “unwanted” dead animals from our lakes, ponds and streams.

The rule is to not feed the crayfish in the gray tub. Always feed them in a small plastic feeding box that has water in it. Observe the crayfish while it is eating. Discard the water in the feeding box after the crayfish has eaten.

1. **How do crayfish find food?** _____

2. **How does the crayfish hold the food?** _____

3. **How does the mouth work?** _____

4. **How often does the crayfish eat?** _____
5. **What does the crayfish like to eat?** _____
6. **Do all the crayfish like the same food?** _____

Draw a picture of the mouth of a crayfish in the space below.

Activity 10: How much does your crayfish weigh (grams) and how long is your crayfish (millimeters)?

Measure the crayfish weekly.

<u>Date</u>	<u>Weight</u>	<u>Cephalothorax Length</u>	<u>Width</u>	<u>Abdomen Length</u>	<u>Total Length</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Is your crayfish a male or a female? _____

Another way to tell the difference between male and female crayfish is by comparing the width of the abdomens. Females should have a wider abdomen. Compare your crayfish with other males and females. Are females wider than males?

Share data for width of abdomen with your classmates. Record the data below (organize your data).

Write a statement comparing the abdomen width of the male and female crayfish – give evidence for your statement.

Activity 11: How do crayfish respond to environmental change?

Observe a crayfish’s response to a rock, to salt, to light, and to the touch of a pencil. When testing the crayfish’s responses, put some aged water in the plastic dishpan and do the testing there. When you are finished, return the crayfish to the gray tub and discard the water.

<u>Stimulus</u>	<u>Backed Away</u>	<u>Moved To</u>	<u>No Response</u>
Rock	_____	_____	_____
Salt	_____	_____	_____
Light	_____	_____	_____
Pencil	_____	_____	_____

Do the crayfish respond if you touch the abdomen? _____

Observations:

1. How do crayfish move?

2. What happens when your hand gets near the crayfish?

3. Do crayfish gather in groups or do they like to be alone?

Scientific Process Planning Form

Identifying Problem / Hypothesizing

What do you want to find out? (Question)

What do you think will happen? (Hypothesis)

Why do you think it will happen?

Planning

What are you going to do? What materials will you use? (You may need to continue to write your plan on another sheet of paper, step by step.)

These things will vary (variables):

These things will always be kept the same (controls):

Making Observations

What are you are going to measure / observe?

Recording Results

How are you going to record your observations?

If you are using a data table, what types of data will you place in it?

Create Your Data Table

Conclusions

What happened? Why do you think it happened? Was your hypothesis correct?

Activity 13: How are mealworms, brine shrimp and crayfish similar?

Did the animals “move toward” or “back away” from these stimuli?

<u>Stimulus</u>	<u>Brine Shrimp</u>	<u>Mealworms</u>	<u>Crayfish</u>
Light	_____	_____	_____
Touch	_____	_____	_____
Vinegar	_____	_____	_____
Salt	_____	_____	_____

1. Compare crayfish and mealworms. How are their responses similar and different?

2. What conclusions can you make about animal responses?

Activity 14: What effect do human activities have on the survival of organisms?

What organism did you study? _____

Describe the ways humans have affected the survival of this organism.
