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# How do lizards get energy from their food?

## *Activity 1: Designing an Experiment*

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All animals need energy to live. While plants and some bacteria can get the energy they need from the sun, animals can only gain energy from the food they eat. In today's class, we're going to design an experiment to determine how lizards can get the most energy from their food.



**1. Why do you think lizards need to get energy from their food? In other words, what kinds of lizard activities require them to use energy?**

Lizards can maximize their energy gain by choosing to eat food that has a high amount of energy, or by choosing to eat food that is easy to eat (in other words, requires them to use a small amount of energy to get the food).

**2. Do you think a lizard would gain more energy eating a big cricket or a small cricket? Why?**

**3. Do you think a lizard would spend more energy eating a big cricket or a small cricket? Why?**



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Lizards that are able to gain energy efficiently (in other words, wasting as little energy as possible) will have more offspring than lizards that do not gain energy efficiently. These offspring will inherit the traits that their parents had, allowing them to gain energy efficiently too. So, after many generations, all the lizards of a species should use energy efficiently.

We will assume that our lizards will choose to eat food that will allow them to be most efficient. We're going to design and conduct an experiment to answer the question: *Do lizards prefer to eat bigger prey (to gain more energy), or do they prefer to eat prey that are easier to eat (to waste less energy)?*

**4. Other than the size of an insect, what would make an insect easy to eat (and therefore, easy to get energy from)?**

5. In our experiment, we will offer two kinds of food to a hungry green anole lizard. (The lizards haven't eaten in two days, so they should want to gain energy from their food!) Talk with the other members of your group to make an experimental plan, which you'll present to the class in a few minutes.

a. The first step in designing our experiment is to decide what two kinds of insect we will offer to a lizard. **What are the two types of insects you think would help us learn about how lizards make decisions that allow them to efficiently gain energy?**

b. In the lizard's cage, we will put each kind of insect under a small cup, and then lift the two cups at the same time. This will allow us to offer both insects at the same time. **Where should the cups be placed in the cage – close to the lizard? far away from the lizard? near the other cup, or far from the other cup?**

c. **What information do you want to collect after we lift the cups?** Try to think of three variables we can measure to help us answer the question *Do lizards prefer to eat bigger prey (to gain more energy), or do they prefer to eat prey that are easier to eat (so that they use less energy)?*

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## *Activity 2: Feeding trials*

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1. In our feeding trials, we will present each lizard with two prey items – a small cricket and a large cricket. In these trials, we want to answer three questions:

a. Does the lizard first eat the small cricket, or the large cricket?

***What do you predict will happen?***

b. Does the lizard first eat the cricket that is easier to eat (requires fewer chews), or the cricket that is harder to eat (requires more chews)?

***What do you predict will happen?***

c. Does the lizard first eat the cricket that is closer to it (requires moving a shorter distance), or the cricket that is farther from it (requires moving a longer distance)?

***What do you predict will happen?***

2. Using your predictions, write a hypothesis explaining which cricket the lizard should eat first, and why. **Complete the following sentence:**

My hypothesis is that lizards will choose to first eat the cricket that \_\_\_\_\_

\_\_\_\_\_

because \_\_\_\_\_

\_\_\_\_\_.

3. Now it's time to see if your hypothesis is supported by real data! Work with your group to set up the feeding trial, with the lizard on one end of the cage, and the two crickets under cups at the other end of the cage. Make a plan with your group to decide who will lift the cricket cups, who will count the number of chews, and who will remember how far the lizard moves to capture the cricket (you'll measure this distance after the trial is over).

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4. Before you begin, confirm with your teacher that everything is ready for your trial. Then, when you begin the trial, **remember to take careful notes on what you observe**. Your notes should include which cricket was eaten first, how many times the lizard chewed to eat that cricket, and how far the lizard ran to catch the cricket. You should also record how many times the lizard chewed to eat the second cricket, and how far the lizard ran to catch it. **Fill in the rest of the table below with these five variables, and use the extra space for your notes.**

<b>Variable name</b>	<b>Observation or measurement</b>
Which cricket was eaten first	
How many chews to eat first cricket	

5. After you have finished your trial, answer the following question.

**Did your results match your predictions? Were you surprised to see what the lizard ate first?**

6. When all the groups in the class have completed their trials, we will combine all of our data to see if, overall, the lizards chose to eat the way we predicted that they would.

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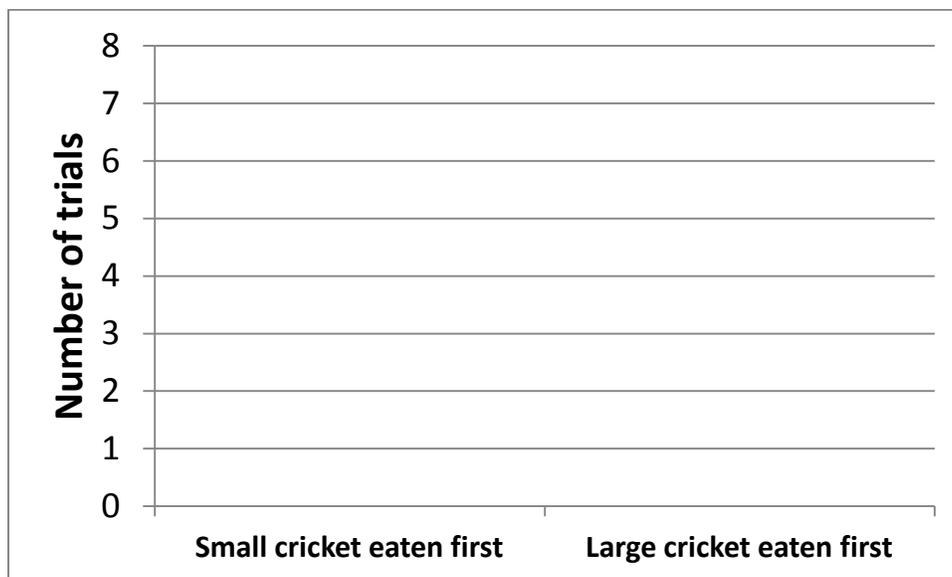
## *Activity 3: Understanding our results*

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Using the data from all the groups in our class, let's answer the three questions we designed the experiment to address.

1. Does the lizard first eat the small cricket, or the large cricket?  
In how many trials did the lizard eat the small cricket first? \_\_\_\_\_  
In how many trials did the lizard eat the large cricket first? \_\_\_\_\_

**Show these data in a column graph**, with one column showing the number of trials where the lizard ate the small cricket first, and the other column showing the number of trials where the lizard ate the large cricket first.



What can you conclude from these data – do lizards show a strong preference for large crickets?

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2. Does the lizard first eat the cricket that is easier to eat (requires fewer chews), or the cricket that is harder to eat (requires more chews)?

What was the average number of chews required to eat the first cricket? \_\_\_\_\_

What was the average number of chews required to eat the second cricket? \_\_\_\_\_

**Now, show the chew data in a column graph**, with one column showing the average number of chews for the first cricket, and the other column showing the average number of chews for the second cricket. *This time, you also have to label the columns on the x axis, and label the y axis.*



**What can you conclude from these data – do lizards show a strong preference for crickets that are easier to chew?**

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3. Finally, does the lizard first eat the cricket that is closer to it (requires moving a shorter distance), or the cricket that is farther from it (requires moving a longer distance)?

What was the average distance the lizard moved to catch the first cricket? \_\_\_\_\_

What was the average distance the lizard moved to catch the second cricket? \_\_\_\_\_

**Show these data in a column graph below. Make sure to label your axes!**



**What can you conclude from these data – do lizards show a strong preference for crickets that are closer to them?**

**4. For homework, use what you learned in this experiment to write a scientific explanation that answers the question: *How do lizards decide what food to eat?***