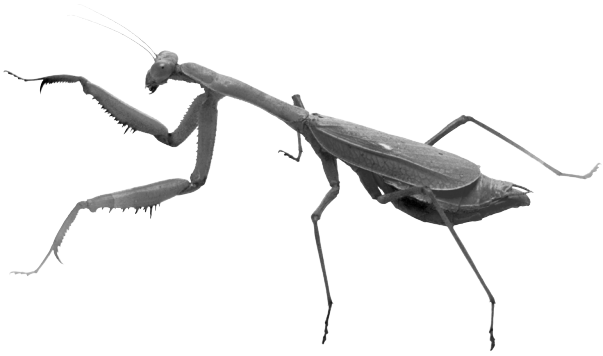
Earth's Birthday Project

AMAZING BUGS®



Pre/Post Questions: **Praying Mantis**

Introduction

Pre/Post Questions are tools for guiding inquiry and assessing student learning. Students answer the questions before they do the activities in the Amazing Bugs kit (Pre) and again after the activities are completed (Post).

Students are not expected to score high points the first time they answer the questions. The Amazing Bugs activities will give them many chances to practice the skills needed to improve their answers in the second round.

Contents

Questions are presented on one-page, reproducible handouts. Each handout is followed by easy instructions, including quick prep and a rubric or answer key for grading. Use one or two questions, or all four—the more time you invest, the more students learn and the more opportunities you have for assessment.

Scheduling, Time, Materials

Schedule the first round (Pre) a few days in advance of the arrival of your live praying mantises. Plan on 15–20 minutes for each question in the first round (Pre), and 10–20 minutes in the second round (Post). The only materials you'll need are two copies of each question, and a pencil, for each student.

Standards and Benchmarks

The teacher's instruction for each question includes New Mexico science and/or math benchmarks.

For more information: earthsbirthday.org/nm

Name _____ Date _____

Praying Mantis Adaptations

All animals, including insects, have ways of moving around, getting food, and protecting themselves from danger. These are called *adaptations.*

A praying mantis is one kind of insect. Describe two adaptations and explain how they could help a praying mantis survive.

1. _____

_____

_____

_____

_____

_____

_____

2. _____

_____

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_____

Question 1: Teacher Instruction

Science Benchmarks

- Scientific Thinking and Practice, Standard I, K–4 Benchmark II – Use scientific thinking and knowledge and communicate findings.
- Content of Science, Standard II (Life Science), K–4 Benchmark I – Know that living things have diverse forms, structures, functions, and habitats.

Teacher Prep

Make 2 copies of Praying Mantis Handout Q 1 for each student—one for Pre, one for Post.

Pre (First Round)

Instructions to students: *The introduction to this question tells you that animals have ways of moving around, getting food, and protecting themselves from danger. These are called adaptations. The question asks you to name and describe two adaptations that would help a praying mantis survive. That means that you should tell what each one is and describe how it works. Do your best. You can use your imagination to make a guess, if you don't know how mantises really protect themselves. It's as important to write a good explanation as it is to know what an actual adaptation is.*

Allow 15–20 minutes.

Post (Second Round)

Have students complete the handout again after they have done all the Amazing Bugs activities. This time it's important to know the actual adaptations.

Allow no more than 15 minutes.

Grading

The maximum possible score is 4 points. A reasonable explanation of an imaginary adaptation is good work, but **only in the first round**. Use the rubric below for grading.

Score	Description
4	The student describes two actual adaptations (e.g., simple eyes on top of head, scary behavior, hard egg case, many eggs, cannibalism) and explains how each helps mantises survive.
3	The student describes two actual adaptations but explains only one of them OR (first round only) describes one actual and one imaginary adaptation and explains both.
2	The student describes and explains one actual adaptation OR describes but does not explain two actual adaptations OR (first round only) describes and explains two imaginary adaptations.
1	The student names one actual adaptation but does not describe it OR (first round only) names and describes one imaginary adaptation.
0	The student does not name or describe an adaptation.

Name _____ Date _____

Praying Mantis Data

Students at Cricket Elementary School observed praying mantises. They put an egg case in a mesh insect house. When the mantises emerged from the egg case, they counted them. The next day they counted again, and they continued to count once a day for seven more days. They recorded the numbers on a data table.

Praying Mantis Data Table

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
Number of Mantises	127	94	67	51	40	32	25	14	5

1. How many times did the students count their mantises? _____

2. How many mantises did the students count on Day 1? _____

3. How many mantises did they count on Day 6? _____

4. Does the data explain why the numbers of mantises changed every day?

   Circle your answer: YES NO

5. Describe one thing the students could do to discover why the number of mantises changed every day.

   _____

   _____

   _____

Question 2: Teacher Instruction

Science Benchmark

- Scientific Thinking and Practice, Standard I, K–4 Benchmark I – Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.

Math Benchmarks

- Data Analysis and Probability, 1 – Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Data Analysis and Probability 3 – Develop and evaluate inferences and predictions that are based on data.

Teacher Prep

Make two copies of Praying Mantis Handout Q 2 for each student—one for Pre, one for Post.

Pre (First Round)

Instructions to students: *Read the handout and answer the questions. You will find some of the answers on the data table. For your answer to question 5, you don't need to write a complete sentence, but be sure to write a clear description.*

Allow about 15 minutes.

Post (Second Round)

Have students complete the table again, two or three weeks later, after they have done all the Amazing Bugs activities.

Allow no more than 10 minutes.

Grading

The maximum possible score is **5 points**. Use the key below for grading questions 1–4. Possible answers for number 5 include: Observe to see what is happening to the mantises; check to see if they have food or water; check to see if they are dying; observe to see if something in the house is eating them; look at them a lot to see what is happening. Any reasonable response should earn the point.

Answer Key	
Question	**Answer**
1	9
2	127
3	32
4	No

Name _____ Date _____

Praying Mantis Prediction

Students at Gomez Middle School observed praying mantises.

- They put 2 large mantises in 2 different insect houses. They named the mantises "Leaf" and "Twig."
- They put 10 crickets in each house.
- They predicted that Leaf would catch and eat more crickets than Twig.
- They watched the mantises for five days.
- They recorded what they saw on a data table.

Praying Mantis Experiment

Day	Number of Crickets Left in House	
	Leaf	Twig
1	10	10
2	9	10
3	7	8
4	6	6
5	5	4

1. How many crickets did Leaf eat? _____

2. How many crickets did Twig eat? _____

3. What did the students predict would happen?

_____

_____

_____

4. Was their prediction correct? Circle your answer: YES NO

Question 3: Teacher Instruction

Science Benchmark

- Scientific Thinking and Practice, Standard I, K–4 Benchmark I – Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.

Math Benchmarks

- Algebra 4 – Analyze change in various contexts.
- Data Analysis and Probability 1 – Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Data Analysis and Probability 3 – Develop and evaluate inferences and predictions that are based on data.

Teacher Prep

Make two copies of Praying Mantis Handout Q 3 for each student—one for Pre, one for Post.

Pre (First Round)

Instructions to students: *Read the handout and answer questions 1–4. Read the table very carefully. You may need to do some math to answer some of the questions.*

Allow about 15 minutes.

Post (Second Round)

Have students complete the table again after they have done all the Amazing Bugs activities.

Allow no more than 15 minutes.

Grading

The maximum possible score is **4 points**. Use the key below for grading questions 1, 2 and 4. The answer to number 3 is "Leaf would catch and eat more crickets than Twig." Students may write this slightly differently. Their answer is correct as long as it has the same meaning.

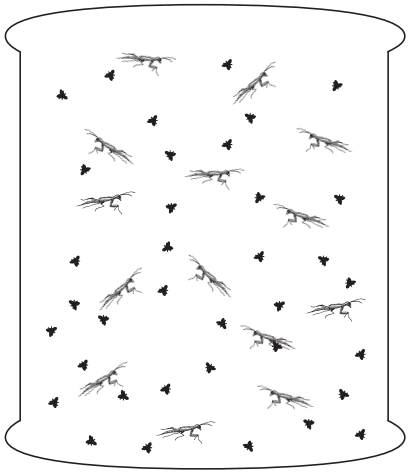
Answer Key	
Question	**Answer**
1	5 (10 minus 5)
2	6 (10 minus 4)
4	No

Name _____ Date _____

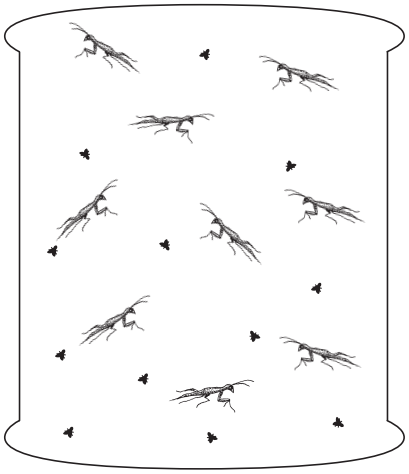
Praying Mantis Behavior

Students at Wild Animal Magnet School put some small praying mantises in an insect house with fruit flies.

= fruit fly, = praying mantis



Picture 1 – Day 1



Picture 2 – Day 6

1. Count the mantises and flies on each of the two days. Write the numbers on the data table.

Day	Mantises	Flies
1		
2		

2. Explain what might have happened in the insect house. (Why did the numbers change? Did the mantises change? How?)

_____

_____

_____

_____

Question 4: Teacher Instruction

Science Benchmark

- Scientific Thinking and Practice, Standard I, K–4 Benchmark I – Use scientific methods to observe, collect, record, analyze, predict, interpret, and determine reasonableness of data.

Math Benchmarks

- Algebra 4 – Analyze change in various contexts.
- Data Analysis and Probability 1 – Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.
- Data Analysis and Probability 3 – Develop and evaluate inferences and predictions that are based on data.

Teacher Prep

Make two copies of Praying Mantis Handout Q 4 for each student—one for Pre, one for Post.

Pre (First Round)

Instructions to students: *Read the handout and answer the questions. The pictures are diagrams of insect houses with praying mantises and fruit flies inside. Question 1 asks you to count the insects and record the numbers on the data table. Question 2 is a critical thinking problem. You must describe why the numbers changed as they did from Day 1 to Day 6.*

Students should write on the back of the page if they need more room for question 2.

Allow 15–20 minutes.

Post (Second Round)

Have students answer the questions again, after they have done all the Amazing Bugs activities.

Allow no more than 20 minutes.

Grading

The maximum possible score is **7 points**, 1 for each number in the table (question 2) and 3 for question 2. A completed version of the table is shown below. For question 2, score 1 point for each of the following: Answer **(1)** states that the numbers of mantises and flies decreased from Day 1 to Day 6 and that the remaining mantises have grown; **(2)** suggests that the mantises have been eating the flies; and **(3)** provides some explanation for why there are fewer mantises (for example, they died or were eaten by other mantises).

Day	Mantises	Flies
1	14	36
2	9	12