

# Reflection Section Answer Guide

## Introduction

- **What is the question the scientists wanted to answer? What is the bigger problem their research might help to solve?** The bigger problem scientists might help to solve is how can we help reduce and slow the release of greenhouse gases into the atmosphere.
- **Do you think the scientists needed to visit and study young tropical forests, or could they do all of their research inside a laboratory?** Scientists need to visit and study young tropical forests because they needed actual measurements of greenhouse gases that are occurring in tropical forests. **Why or why not?** A laboratory setup would not suffice in this situation to get accurate results.

## Methods

- **Why do you think the scientists studied all four types of areas, instead of just studying young tropical forests?** A comparison is necessary to give meaning to the data. The scientists studied all four types of areas to be able to describe how much nitrous oxide was being released in each area. The data were compared from each area to find out the rates nitrous oxide was released. If the scientists only studied one site, the data would be meaningless to answer the research question.
- **Do you think that the scientists found that more, the same, or less nitrous oxide was in the soil of young tropical forests compared with the soil in the pasture being used by cattle?** Each student's experience should help him/her answer this question. Have the students describe why they gave their answer with proper justification. **Why?** The young

forest should contain less nitrous oxide in the soil than the pasture because more biotic activity is occurring in the young forest soil

## Findings

- **What are two things happening in tropical pastures that might be increasing the amount of nitrous oxide being released into the atmosphere?** (1) Cattle hooves compact the soil, resulting in pasture land less able to absorb and drain water. (2) Anaerobic bacterial activity increases in pastures when animal waste is near the soil's surface.
- **The scientists measured the amount of nitrous oxide 2 centimeters below the surface of the soil. Do you think that same amount of nitrous oxide is being released into the atmosphere? Why or why not?** Because soils do not release all of the gases they hold, the amount of nitrous oxide released into the atmosphere is not necessarily the same amount as that measured in the soil.

## Discussion

- **What other things do you know about the effect of greenhouse gases?** This answer depends on the student's science experience. Have students discuss the topic with each other in a class discussion. Discussion topics include local and global implications of climate change and effects on the atmosphere from human activities, such as use of fossil fuels, pollution, and deforestation. Your class can also discuss observed and potential future effects of climate change on plant and wildlife species.
- **Do you think that no matter where they are on the planet, pastures cause more nitrous**

oxide to be released than would happen if the land were a forest? Why or why not? Students should give their answer and use logic to back it up. Research shows that the amount of nitrous oxide released from pastures compared with forests is highly variable. Studies have shown different results in other areas. In some areas, pastures release more nitrous oxide than forests. In others, forests release more nitrous oxide. Scientists believe the amount of water held by pasture soils may be related to the amount of nitrous oxide released.