

# SPLAT! Reflection Section Answer Guide

## Introduction

Pheromones have also been used to attract thousands of beetles to certain trees. The beetles would be killed as they arrived at the tree, or the tree would be removed or burned after attack. How is SPLAT Verb different? What is one advantage of using SPLAT Verb over the attractant pheromone?

*Students will have individual answers to this question and may need help thinking it through. The repellent SPLAT Verb keeps beetles away from trees. The attractant pheromone attracts beetles to a target tree. Three disadvantages of using the attractant pheromone are: (1) Something must be on the target tree and available and able to kill the beetles, such as an insecticide; (2) nearby trees may be damaged or killed by the beetles; and (3) the target tree must be removed from the forest or burned.*

If you were the scientist, how would you conduct this experiment?

*Students will have individual answers to this question. They should, however, realize that SPLAT Verb would need to be applied to trees that scientists want to protect and the trees would need to be observed throughout the period when beetles are emerging, flying, and attacking new trees.*

## Methods

Why did the scientists use bait to attract mountain pine beetles to the 60 trees?

*The scientists wanted to test the success using SPLAT Verb to protect lodgepole pine trees. By using bait to attract beetles to the trees, the scientists could feel more assured that any experimental trees with no visible mountain pine beetle attack were repelled by SPLAT Verb. In addition, by attracting beetles to all 60 trees, any changes in the amount of beetle attack could be more confidently attributed to the experimental treatment.*

Why did the scientists observe trees within an 11-meter radius of the individual lodgepole pine tree?

*Students will have individual answers to this question. They should, however, reason that by observing trees close to the treated individual tree, the scientists could determine whether, or how well, the SPLAT Verb repelled beetles from nearby trees as well as the tree with the SPLAT Verb.*

Why did the scientists look for signs of beetle attack, as well as for tree death?

*The scientists were ultimately interested in whether the SPLAT Verb protected lodgepole pine trees from death following a beetle attack. However, by identifying the kind of attack the tree experienced, if any, the scientists could better understand the relationship between the type and extent of mountain pine beetle attack and tree death.*

Why did the scientists want to find out whether verbenone was present in SPLAT Verb over a 30-day period?

*Students will have individual answers to this question. They should realize, however, that the scientists were also interested in how long the SPLAT Verb might protect individual trees from pine beetle attack.*

## Findings

Look at figures 12 and 13. Examine the untreated control in each figure. What is one possible explanation for the differences in the percentage of trees killed between the untreated controls? If you need a hint, reread the third paragraph in the “Methods” section.

*Students should realize that bait was stapled to each tree. The bait could have attracted more beetles to the individual tree than to the trees in the circle surrounding each tree. This bait would have made the single tree more attractive and lessened the attacks on surrounding trees.*

Consider all of the information collected by the scientists in this experiment. What do you think they concluded about the success of SPLAT Verb technology to protect individual trees from mountain pine beetle attacks?

*Students should realize that the scientists would consider the SPLAT Verb application a success, if 14.7 milligrams of the verbenone in SPLAT Verb would be released every day for 105 days.*

What might the scientists conclude about the success of SPLAT Verb technology to protect trees within an 11-meter circle around each tree?

*Based on the findings, students should realize that the scientists might conclude that most of the trees within an 11-meter circle of the treated tree would be protected by SPLAT Verb.*

## Discussion

Think about trying to protect hundreds or thousands of acres of lodgepole pine trees from mountain pine beetle attacks. What is one limitation of the technology and method tested by the scientists?

*Students will have individual answers to this question. They should, however, realize that applying dollops of SPLAT Verb to individual trees over hundreds or thousands of acres would take too much time and too many people to make it practical.*

Describe a research project that could determine how to use SPLAT Verb to protect larger areas of pine trees from mountain pine beetles.

*Students will have individual answers to this question. Students should describe a study that identifies a larger area to be tested, then describes a way to apply SPLAT Verb to trees within that area, as well as a way to observe and assess the trees’ health. This question can be answered in small groups or in a class discussion.*

# Time Warp

## SPLAT! • Reflect and Connect Answer Guide

What are two ways this research from the 1960s is similar to and different from the research in “SPLAT!”? Discuss with a partner or write your answers using complete sentences and correct punctuation.

*Students will have individual answers to this question. Some potential similarities students may notice include: the scientists were studying a similar problem of bark beetles and pine trees, scientists relied on chemicals to control bark beetles, and the scientists’ tests showed that the chemicals were potentially useful. Potential differences include: the scientists studied different types of bark beetles and pine trees, the scientists conducted their research in different parts of the United States, one group of scientists used the expertise of a for-profit company, and the scientists used different chemicals and application methods.*

The scientists in this research counted the number of living and dead or dying beetles in each log to determine the results of each treatment. How is that method different from the methods used by the “SPLAT!” scientists? What did the “SPLAT!” scientists do to learn about the presence of beetles?

*After reading both “SPLAT!” and the Time Warp research, students should realize that “SPLAT!” scientists counted trees impacted and not impacted by the mountain pine beetles to*

*determine if the chemical application worked. This method is in contrast to the Time Warp scientists who counted living and nonliving bark beetles to determine if the chemical application was successful. “SPLAT!” scientists made visual observations of the trees to determine if bark beetles attacked the tree. The scientists looked for signs of bark beetles on the bark of the tree and also looked for crown fade which indicates the bark beetles attacked and killed a tree.*

The scientists found that a large percentage of western pine beetles were dead even when the treatment was applied 5 months before beetles emerged. If you were a scientist and you were conducting more research on this topic, what’s one thing you would like to know more about? *The students will have individual answers to this question. Students may want to know if the treatment is effective further ahead of the beetle emergence. For instance, maybe the treatment is equally effective 7 months ahead of beetles emerging, but not effective 8 months before beetle emerge. Students may also want to know about the effectiveness of treatments with lower levels of chemicals, or about the effectiveness of the treatment if applied over a larger area, like a whole pine stand.*