Name: _____ Date: _____ Period: _____

The Secret Life of the *Ailanthus altissima* Wk #: _____

Directions: Read, annotate, and answer the questions.

Ailanthus altissima has been extremely successful in invading and dominating many major cities in the United States. Often referred to as the Tree of Heaven, the *Ailanthus altissima* was introduced to the United States from China in the early 1800's as a food source for silk worms. It grows especially well in polluted urban environments that lack open space and an abundance of nutrient rich soil. This is one of the reasons that the plant is well adapted to the concrete covered streets of Chicago. It can often be found growing in alleys, through cracks in the sidewalk, and on the sides of buildings. Many other native plants are unable to thrive in such inhospitable environments.

The growth rate and multiple modes of reproduction give the *Ailanthus altissima* a competitive advantage over other types of plants. It produces large amounts of winged seeds that are widely dispersed by the wind. *Ailanthus altissima* can also spread rapidly by growing from stumps or from its wide network of roots. Another advantage is the extremely rapid growth rate. The average height reported for a one-year-old tree is 1.3 feet. This rate make *Ailanthus altissima* one of the fastest growing trees in the United States.

Another factor contributing to the success of the *Ailanthus altissima* is a chemical produced within the body of the plant. This chemical, considered to be allelopathic, provides protection for the plant in two distinct ways. First, it changes the taste of the plant, which makes it undesirable to herbivores. Secondly, the plant releases this chemical into the environment which inhibits the growth of neighboring plants.

Allelopathic chemicals may be found at different concentrations in different parts of a plant. It is simple to determine whether a plant produces allelopathic chemicals. Scientists can collect roots, leaves, or stems and make a "tea" from them. A tea is made by adding plant material to boiling water to allow for the allelopathic chemicals to be released into the water. The tea can be used to germinate seeds. When compared to the control group, if the seed's growth is reduced, it can be concluded that the plant produces chemicals with allelopathic properties.

1. (RST.9-10.4.) Explain the meaning of these words using prefixes, suffixes, and context clues.

abundance: _____

thrive: _____

inhospitable: _____

modes: _____

dispersed: _____

herbivores: _____

inhibits: _____

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2. (RST.9-10.2.) Scientists studying *Ailanthus altissima* in the city of Chicago have noticed that it thrives compared to many native plants. What characteristics does the city possess that makes it an ideal location for *Ailanthus altissima*?

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3. (RST.9-10.2.) Explain how the *Ailanthus altissima* has a reproductive advantage over many other types of plants.

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4. (RST.9-10.2.) Which of the following statements best summarizes the main idea of Paragraph 3?
   a. Predators avoid the *Ailanthus altissima* because of the plants ability to invade space occupied by native plants.
   b. *Ailanthus altissima* benefit from allelopathic chemicals that provide protection from predation and competing plants.
   c. Many plants, such as the *Ailanthus altissima,* attract herbivores by releasing allelopathic chemicals into the environment.
   d. *Ailanthus altissima* produce allelopathic chemicals that do not play a significant role in the life of the plant.

5. (RST.9-10.2.) In your own words, describe the effect of allelopathic chemicals on other plants.

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6. (RST.9-10.2.) Describe how scientists can determine if a plant has allelopathic chemicals.

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7. (RST.9-10.2.) If a seed exposed to tea prepared from the leaves of *Ailanthus altissima* grows less than the seed exposed to pure water (control group), what does this suggest?

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