1. In the space below, draw a piece of a raspberry branch:
    a. The stem is 15 centimeters long.
    b. Every 1.5 centimeters, there is a thorn which is 0.5 centimeters (or 5 millimeters) long.

2. In the space above, draw a deer's mouth:
    a. A deer's tongue is 3.2 centimeters wide. Because it doesn't have fingers like we do, a deer uses its tongue to pull leaves, branches, and bark into its jaw to chew with its teeth.

3. Will the deer's tongue be poked by a thorn if it picks up the branch?

4. You can also express your answer to number 3 as a mathematical statement. An example of a mathematical statement is, "My arm, which is 64 cm long, is greater than my hand, which is 18 cm long" OR 64>18.

    Fill in the blanks:

    Centimeters between thorns   Centimeters wide deer's tongue

    _____   _____

                                    ↑between the numbers, write <, >, or =

5. The Japanese beetle is about 0.8 cm (or 8 millimeters) long. Its mandibles can open to 0.2 centimeters (2 millimeters) wide. Draw a beetle with these measurements next to the raspberry stem. Can the beetle take a bite of the stem that avoids the thorn?

6. Write your answer as a mathematical statement.

    Centimeters between thorns   Centimeters wide beetle's mouth

    _____   _____

                                    ↑between the numbers, write <, >, or =

7. On the sage plant, leaves are covered in hairs. A sage leaf is 2 centimeters long and only 0.1 cm (or 1 millimeter) thick. This is very small and hard to draw, so let's pretend we have a magnifying glass that makes everything five times bigger. Calculate what the leaf size would look like with this magnifying glass:

    Sage leaf length: 2 centimeters x 5 times magnification = 2 x 5= _____centimeters

    Sage leaf thickness: 1 millimeter x 5 times magnification = 1 x 5=_____ millimeters

8. Sage leaf hairs are spaced every 0.1 centimeter (1 millimeter) along the leaf and are 0.2 centimeters (2 millimeters) long. Calculate how far apart and how long these hairs would look under your magnifying glass:

Hairs are this far apart: _____ x five times magnification= ____ x 5= _____

Hairs are this long: _____ x five times magnification= ____ x 5= _____

9. Draw the magnified leaf length and thickness that you multiplied, and add the hairs that you calculated too!

10. What would the deer tongue and beetle look like at this magnification? Calculate their sizes and then add them to the drawing of the magnified leaf:

Deer tongue is this wide _____ x five times magnification= ___ x 5= _____

Beetle body is this long _____ x five times magnification= ___ x 5= _____

Beetle mandibles open this wide _____ x five times magnification= ___ x 5= _____

11. How thick is the magnified sage leaf including its leaf hairs?

Leaf thickness + Leaf hairs on one side + Leaf hairs on the other side = Leaf with hairs

_____ + _____ + _____ = _____

12. Can the beetle fit its mandibles around the sage leaf with hairs?

Sage leaf with hairs   Magnified beetle mandibles open this wide

_____   _____
                ↑between the numbers, write <, >, or =

13. Can the deer fit its tongue around the sage leaf with hairs?

Sage leaf with hairs   Magnified deer tongue width

_____   _____
                ↑between the numbers, write <, >, or =

14. CIRCLE the animal that can eat a plant with thorns, and put an X through the animal that cannot.

   Deer   Beetle

15. CIRCLE the animal that can eat a plant with leaf hairs, and put an X through the animal that cannot.

   Deer   Beetle

16. CIRCLE the animal that can eat a plant with waxy leaves, and put an X through the animal that cannot (hint: a blueberry has wax).

   Deer   Beetle