Answer Key

Answers to questions under bullet #7:

a. How do you know when a solution is saturated?
   If more solute is added and it does not dissolve, then the original solution was saturated. You will notice in the simulation, if you continue to add solute after saturation, it collects on the bottom of the container.

b. When a solution is saturated, and additional solid solute is added, what happens?
   You will notice in the simulation, if you continue to add solute after saturation, it collects on the bottom of the container.

c. How does adding this additional solute change the concentration of the saturated solution?
   It does not change the concentration of the saturated solution.

d. How does evaporation change the concentration of a saturated solution?
   Evaporation does not change the concentration of a saturated solution.

Answers to questions under bullet #9:

a. How can you measure the concentration of the solution inside the dropper?
   Possible Answer: You can drain the water from the tank, add only solution into the tank, and place the concentration sensor into the solution.

b. How might you get that concentrated solution to become saturated?
   Possible Answer: You can evaporate the solution until there is solute at the bottom of the tank. Then add enough additional solution for it to become saturated.

c. Does it work?
   Answers will vary

d. Do you think it would work for other solutions? Yes or No Why or why not?
   Answers Will Vary

e. Are the concentrations of all of the solutions the same?
   No

Answers to questions under questions sheet:

1. List at least two ways the home use and the farm use products are different.
   Answers here can vary. Some main ideas to look for are: Glyphosate is regulated in commercial usages; it is not regulated at home. Commercial applicators are required to be trained to use products while home applicators are not.

2. Why did all of the units need to be the same on our calculations?
   To make sure that we are comparing the same amounts of the same substance. If we used different units, it would paint an incorrect picture with our data.

3. How are home application and farm application likely to be different? (Hint: Think back to the video. What tech do farmers have?)
   Answers here may vary.

4. Based on the evidence seen above, are you surprised by any of the numbers you calculated? Did it seem more or less than you anticipated?
   Answers will vary.

5. Based on this particular set of data, how do farmers and homeowners compare in their use of the chemical glyphosate. (Include the terms, area, active ingredient, and concentration in your answer.)
   Student responses will vary. Ultimately, they should understand that commercial applications use less Glyphosate per sq ft than home applications.

Concentrating on Concentrations - ANSWER KEY

What you need to know!

% Glyphosate: ??
(v/v) Amount of Product: ??
Amount of Water: ??
Area Covered: ??

Helpful Conversions!

32 oz. = 1 qt.
128 oz. = 1 gal.
43,560 sq-ft. = 1 Acre

How to Calculate Concentration of Glyphosate:

$$\frac{(\text{Amount of Product in oz.})(\%\ \text{Glyphosate in Product})}{(\text{Amount of Water in oz.})} = \%\ \text{Glyphosate/Water}$$

How to Calculate Glyphosate / Sq ft:

$$\frac{(\text{oz. of glyphosate})}{(\text{Area Covered in Sq-ft.})}$$

Scenario	% Glyphosate	Amount Product	Amount Water	Area Covered	% v/v Glyphosate/Water	Glyphosate/ Sq-ft.
EPA Regulations	41%	256 oz	5,632 oz	43,560 sq-ft	1.86	.0059
Farm 1	41%	2,240 oz	128,000 oz	3,049,200 sq-ft	.7175	.0007
Farm 2	41%	25.6 oz	2,560 oz	43,560 sq-ft	.41	.0006
Farm 3	41%	1920 oz	80640 oz	1,873,080 sq-ft	.976	.0010
Home, Premixed	2%	128 oz	128 oz	300 sq-ft	2	.4267
Home, Concentrate	5.030%	32 oz	128 oz	75 sq-ft	1.2575	.4267
Home, Super Concentrate	50.2%	2.5 oz	128 oz	300 sq-ft	.980	.0083
Home, Dry Mix	73.3%	128 oz	128 oz	300 sq-ft	73.3%	.4267