

Calibration Practice Problem Set: Answers

1. The turf manager at Tiger Stadium has a tractor-mounted sprayer that has 5 nozzles and covers a 10-ft swath. The sprayer is operated at 3 mph and the manager wishes to apply 20 gallons of spray solution per acre.

A. How many mL should each nozzle emit per minute?

$$\frac{(20 \text{ GPA})(3 \text{ MPH})(24'' \text{ SPACING})}{5940} = 0.24 \text{ GPM}$$

$$(0.24 \text{ GPM}) * (3785 \text{ ml/gallon}) = \mathbf{908.4 \text{ ml/nozzle/minute}}$$

B. What size nozzles should be used?

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C. If the manager uses Weedone 3.8L at a rate of 0.5 lb ai/acre, how many milliliters should be added for each 100 gallons of spray solution.

$$(100 \text{ gallons}) * (\text{acre}/20 \text{ gall}) * (0.5 \text{ lb ai/acre}) * (\text{gall}/3.8 \text{ lbs}) * (3785 \text{ ml/gall}) = \mathbf{2490.1 \text{ ml}}$$

D. If the field dimensions are 300 ft x 150 ft, how many more acres could the manager spray with what is remaining in the tank?

$$300 \text{ ft} \times 150 \text{ ft} = 45,000 \text{ sq-ft}$$

$$45,000 \text{ sq-ft} * (\text{acre}/43560 \text{ sq-ft}) = 1.03 \text{ acres}$$

$$100 \text{ gallons} * (\text{acre}/20 \text{ gall}) = 5 \text{ acres}$$

$$5 - 1.03 = \mathbf{3.97 \text{ acres}}$$

2. A farmer has a spray rig that has 10 nozzles and covers a 15-ft swath. The spray rig is operated at a speed of 3 mph and emits an average of 900 ml per nozzle per minute traveled.

A. How many gallons are being applied per acre?

$$900 \text{ ml} * (\text{gall}/3785 \text{ ml}) = 0.24 \text{ GPM}$$

$$(\text{GPA})(3 \text{ MPH})(18'' \text{ SPACING})/5940 = 0.24 \text{ GPM}$$

$$\text{GPA} = \mathbf{26.4}$$

B. If 70 acres of the crop are to be treated with clomazone (Command 4EC) at 1.0 lb ai/acre, how many ounces of product are needed?

$$(1 \text{ lb ai/acre}) * (\text{gall}/4 \text{ lbs}) * 70 \text{ acres} * (128 \text{ oz/gall}) = \mathbf{2240 \text{ oz}}$$

3. A consultant tells a farmer to spray Bidrin 4EC at 1 gallon: 10 acres for stink bugs. The boom covers 18 feet and has 12 nozzles. The average output is 1200 mL per minute and the spray speed is 4 mph.

A. What rate, given in lbs ai/acres is the farmer spraying?

$$(4 \text{ lbs/gall}) / (x) = 10$$

0.4 lbs ai/acre

B. How many gallons per acre is the sprayer applying?

$$1200 \text{ ml} * (\text{gall}/3785 \text{ ml}) = 0.32 \text{ gall}$$
$$0.32 = (18'' \text{ SPACING})(4 \text{ MPH})(\text{GPA})/5940$$

GPA = 26.4

C. If the farmer has a 200 gallon tank on his sprayer, how many gallons of Bidrin should be added to each tank?

$$200 \text{ gall} * (\text{acre}/26.4 \text{ gall}) * (0.4 \text{ lb ai/acre}) * (\text{gall}/4 \text{ lbs}) = \mathbf{0.76 \text{ gall}}$$

4. A farmer has an 8 row spray rig with rows spaced 40 inches. The sprayer has 16 nozzles and the travel speed is 3 mph. Glyphosate will be sprayed on RoundUp Ready soybean at 1qt/acre using Honcho 4L.

A. How many ml should each nozzle emit per minute if he wishes to apply 20 gallons per acre?

$$(20 \text{ GPA})(3 \text{ MPH})(20'' \text{ SPACING})/5940 = 0.2 \text{ GPM}$$
$$0.2 \text{ GPM} * (3785 \text{ ML/GALL}) = \mathbf{757 \text{ ml/min/nozzle}}$$

B. How many gallons of Honcho and a non-ionic surfact (0.25% v/v) should be added to a 750 gallon spray tank?

$$750 \text{ gall} * (\text{acre}/20 \text{ gall}) * (1 \text{ qt/acre}) * (\text{gall}/4 \text{ qts}) = \mathbf{9.375 \text{ gall Honcho}}$$
$$750 * 0.0025 = \mathbf{1.875 \text{ gall surfactant}}$$

C. How many lbs ai/acre of glyphosate are being applied?

$$(x \text{ lb ai/acre}) * (\text{gall}/4 \text{ lbs}) * (4 \text{ qts/gall}) = 1 \text{ qt}$$

1 lb ai/acre

5. A farmer has a 100 acre field of corn which he wishes to treat with Atrazine 4L. The farmer wishes to treat a 12-inch band of a 36-in row. Each nozzle emits 1000 mL per minute and the tractor speed is 4 mph.

A. How many gallons of carrier will be needed to treat the field?

$$0.26 \text{ GPM} = (4 \text{ MPH})(12'' \text{ SPACING})(\text{GPA})/5940$$

$$\text{GPA} = 32.2$$

$$(100 \text{ ACRES})(12''/36'') = 33.3 \text{ acres sprayed}$$

$$32.2 \text{ GPA} * 33.3 \text{ acres} = \mathbf{1072.3 \text{ gallons carrier}}$$

B. Atrazine is applied at a rate of 1.5 lb ai/acre on a broadcast basis. How many gallons of product should the farmer add to a 250 tank?

$$250 \text{ gall} * (\text{acre}/32.2 \text{ gall}) * (1.5 \text{ lb ai/acre}) * (\text{gall}/4 \text{ lbs atrazine}) = \mathbf{2.91 \text{ gallons}}$$