CALIBRATION PROBLEMS (with answers)

1. A 150 gallon sprayer with a 15 nozzle boom sprays an area 25 ft. by 174.2 ft.
If it takes 4 gallons of water to refill the tank what is the spray rate in gallons per acre? gpa = (4 x 43,560) ÷ (25 x 174.2) = **40 gpa**

How many acres can you spray per tank? 150 gal ÷ 40 gpa = **3.75 A**

2. You have a 5 acre grass pasture that is heavily infested with Canada thistle. To get rid of the thistle you decide to treat it with Tordon 22K (2.0 lb ai/gal) at a recommended rate of 1.0 lb ai/a. Your 200 gal sprayer delivers 35 gal/a of water. How much Tordon 22K should be added to the spray tank to treat the 5 acre pasture? 1 lb ai/a ÷ 2 lb ai/gal = 0.5 gal Tordon/a

0.5 gpa Tordon x 5 a = **2.5 gal Tordon**

How much water should be added to the spray tank to treat the 5 acre pasture? 35 gpa x 5 a = 175 gal solution
175 gal - 2.5 gal Tordon = **172.5 gal water**

3. Allowing a + or - 5 percent variation from a new nozzle, which of the following 8002 nozzles should be replaced?

NOZZLE	FLOW RATE (oz/min at 40 psi)
1	26.0 (new check nozzle)
2	25.5
3	26.0
4	27.5
5	25.2
6	25.4
7	26.2
8	20.1
9	28.3
10	25.8

5% of 26 = 26 x 0.05 = 1.3
Need to replace any nozzle that sprays less than 26 - 1.3 = 24.7
Need to replace any nozzle that sprays greater than 26 + 1.3 = 27.3.
replace nozzles 4, 8 and 9.

4. An applicator needs to spray a 35 acre field using Ally (60% df). The label directions recommend that 0.1 oz product/acre be applied. The applicator has a 200 gallon spray tank with a spray width of 33 ft. He measured off 132 ft. in the field, filled the spray tank to a given level with water, sprayed the measured distance and refilled the tank with 2 gallons of water. What is the spray rate in gallons/acre?
gpa = (2 gal x 43,560 ft^2/a) ÷ (33 ft x 132 ft) = **20 gpa**
How many acres can be sprayed with a full tank? 200 gal ÷ 20 gpa = **10 acres**
How many gallons are needed to spray the 35 acres? 35 acres x 20 gpa = **700 gal**
How much Ally needs to be added to a full tank? 10 acres x 0.1 oz product/a = **1 ounce**
How many ounces of Ally are needed to treat the 35 acres? 35 acres x 0.1 oz/a = **3.5 oz**

5. In calibrating your 200 gallon band sprayer you find it sprays 0.41 gallons of water after traveling 300 ft., using 6 nozzles, each spraying a 12-inch band centered over 36-inch row spacings. What is the spray rate in gallons/a on the bands?
gpa = (0.41 gal x 43,560 ft^2/a) ÷ (6 ft x 300 ft) = **10 gpa**
You have 100 acres of corn with 36-inch row spacing and want to apply atrazine at a rate of 0.25 gal/acre. How many treated acres per tank are possible? 200 gal ÷ 10 gpa = **20 treated acres**
How many field acres will be covered per tank? 20 acres x 36 in ÷ 12 in = **60 field acres**
How many treated acres are in the field? 20 TAT ÷ 60 FAT = 0.33 x 100 a = **33.3 a**
How many gallons of spray mixture will it take to spray the 100 acre field? 33.3 acres x 10 gpa = **333 gal**
How much atrazine is needed? 33.3 a x .25 gpa = **8.3 gal**

6. You need to apply 10 lb/A of granular herbicide in a 12-inch band over each row. A 300 ft distance is used for calibration. How many ounces of material should be collected per row?

lbs granules collected = lbs gran/a desired x area measured
                                    43,560 ft²/a

(10 lb x 300 ft x 1 ft.) ÷ 43,560 ft.²/a = 0.069 lb

0.069 lb x 16 oz/lb = **1.1 oz.**

7. When calibrating a hand operated centrifugal granular applicator you apply 4 ounces of material to 1/100 of an acre. How many lb are you applying per acre? 43,560 ft²/a x 0.25 lb ÷ 435.6 ft² = **25 lb/a**
If the material is a 2% pelleted material how many pounds of active ingredient are you applying per acre? 0.02 x 25 = **0.5 lbs ai/a**

8. A field sprayer with nozzles spaced 20 inches apart will be operated at 30 psi pressure. After determining that all nozzles are spraying the same amount, discharge from one nozzle is collected for 1 minute and is found to be 40 oz. What is the spray rate when operating at 4 mph?

gpa = (40 oz/min x 46.4) ÷ (4 mph x 20 in) = **23.2 gpa**

9. You need to calibrate a high pressure hand gun. You find that it takes you 60 seconds to spray 1/128th of an acre. In 60 seconds your spray gun applies 125 oz. of water. How many gallons of water per acre are you applying? Because a gallon is 128 ounces and the area is 1/128th of an acre: ounces collected = gallons per acre. Therefore, the answer is **125 gpa.**

10. A sprayer is configured to meet the following conditions:
  1) 20 gpa
  2) Broadcast application using flat fan nozzles, on 20 inch centers, to weeds that are 3 inches tall
  3) 40 psi
  4) Apply 0.5 quart of a 4 EC herbicide
  5) Sprayer has a 300 gallon tank
  6) Sprayer covers 100 ft in 11.4 seconds

Do the following:
  1) Select an appropriate nozzle size (use formulas from TeeJet handout)

        gpm = 20 gpa x 6 mph x 20 in ÷ 5940 = 0.4 gpm

        From the Tee Jet table handout, 8004

  2) Specify nozzle height above target

        23 inches, Rule of thumb or chart

  3) Determine amount of chemical to add to tank

        300 gal ÷ 20 gpa = 15 a x 0.5 qt/a = **7.5 qt/tank**

11. An applicator is having problems with his spray rig and asks you to help him calibrate it. He wants to broadcast a formulated spray solution at the rate of 12 gpa. He has 8001 nozzles on 20 inch centers and his pressure is set at 20 psi. The boom is set 20 inches above the target. You time his rig as traveling 100 ft in 14 seconds. What suggestions, if any, can be made to improve the sprayer's performance?

  gpm = 12 gpa x 5 mph x 20 in ÷ 5940 = 0.2 gpm

  Change to 8002 nozzles and increase the pressure to 40 psi (use the TeeJet table).