THE FORMULAS BELOW MAY BE NEEDED IN THE FOLLOWING CALIBRATION PROBLEMS

(There will be a list of calibration formulas similar to this for you to refer to while taking the exam.)

$$\text{GPA} = \frac{43{,}560 \times \text{Gallons Used on area}}{\text{Length (FT.)} \times \text{Swath Width (FT.)}}$$

$$\text{Swath Width (FT.)} = \frac{\text{Number of Nozzles} \times \text{Nozzle Spacing (IN.)}}{12}$$

$$\text{MPH} = \frac{204}{\text{Seconds to Travel 300 Feet}}$$

$$\text{Broadcast Spraying GPA} = \frac{\text{Ounces per Minute} \times 46.4}{\text{Nozzle Spacing (IN.)} \times \text{MPH}}$$

$$\text{Band Spraying GPA} = \frac{\text{Ounces per Minute} \times 46.4}{\text{Bandwidth (IN.)} \times \text{MPH}}$$

$$\frac{\text{Pounds Active Ingredient Per Acre}}{\text{Percent Active Ingredient}} = \text{Pounds of Pesticide Product per Acre}$$

$$\frac{\text{Pounds Active Ingredient per Acre}}{\text{Pounds per Gallon}} = \text{Gallons of Pesticide Product per Acre}$$

$$\frac{\text{Gallons in tank}}{\text{gallons sprayed per acre}} = \text{acres sprayed per tank}$$

purchased material to put in tank = Acres tank will treat X Purchased material per acre

CALIBRATION PRACTICE PROBLEMS

These problems are from the **study manual** but the format is similar to the Exam problems.

1-1. Calculate the swath width in feet (FT.) if the spray equipment has 13 nozzles on 20 inch (IN.) spacings. (page 32)

1-2. What will the application rate be in gallons per acre (GPA) if 6.5 gallons are used to treat an area 660 feet long and 21.7 feet wide? (page 32-33)

1-3. If an applicators spray equipment travels 300 feet in 51 seconds, what is the speed in miles per hour (MPH)? (page 33-34)

1-4. How many gallons per acre (GPA) **(broadcast rate)** is applied by a spray rig that travels at 4 miles per hour (MPH), delivers 35 ounces per minute, and has a nozzle spacing of 20 inches (IN.)? (page 34)

1-5. How many gallons per acre (GPA) (broadcast rate) is applied **while banding** by a spray rig that travels at 4 miles per hour (MPH), delivers 31 ounces per minute, and is treating a bandwidth of 12 inches (IN.)? (page 34) (NOTE: Although this is the amount that would be broadcast on 1 acre of treated area a greater number of acres of crop would be treated because of the alternating bands and skips. The number of acres of crop depends on the row spacing and the band with. For example if the row width is 36 inches and the band treated is 12 inches there would be 3 acres of crop for every 1 acre of surface actually treated.)

1-6. If the label on a 50% wettable powder states; use 1.0 pounds of active ingredient per acre, how many pounds of the product are needed to treat one acre? (page 35-36)

1-7. If a pesticide formulation contains 4 pounds of active ingredient (a.i.) per gallon and you want to apply 2.0 pounds of active ingredient per acre, how many gallons of the product are needed to treat one acre? (page 36-37)

1-8. For a spray rig that delivers 25 gallons per acre (GPA) and has a 200 gallon tank, how many gallons of a 4 pounds ai per gallon pesticide must be added to each tank at a rate of 2 pound ai per acre? (page 36)

1-9. For a spray rig that delivers 25 gallons per acre (GPA) and has a 200 gallon tank, how many pounds of a 50 % purchased pesticide must be added to each tank at a rate of 1 pound ai per acre? (page 37)

ANSWERS:

1. 21.7 feet
2. 19.8 gallons per acre (GPA)
3. 4 miles per hour (MPH)
4. 20.3 gallons per acre (GPA) (while making a broadcast application)
5. 30.0 gallons per acre (GPA) (while banding i.e. actually treating 1 acre but covering more acres of crop.
6. 2 pounds
7. 0.50 gallons per acre
8. 4 gallons
9. 16 pounds

CALIBRATION PRACTICE PROBLEM SOLUTIONS

These problems are from the study manual but the format is similar to the Exam problems.

1-1. Calculate the swath width in feet (FT.) if the spray equipment has **13 nozzles** on **20 inch** (IN.) spacings. (page 32)

$$\text{Swath Width (FT.)} = \frac{\text{Number of Nozzles x Nozzle Spacing (IN.)}}{12} =$$

$$\frac{13 \text{ nozzles X } 20 \text{ inches}}{12} = \frac{260}{12} = \mathbf{21.7}$$

1-2. What will the application rate be in gallons per acre (GPA) if **6.5 gallons** are used to treat an area **660 feet** long and **21.7 feet wide**? (page 32-33)

$$\text{GPA} = \frac{43{,}560 \text{ x Gallons Used on area}}{\text{Length (FT.) x Swath Width (FT.)}} = \frac{43{,}560 \text{ X } 6.5}{660 \text{ X } 21.7} = \mathbf{19.8}$$

1-3. If an applicators spray equipment travels **300 feet in 51 seconds**, what is the speed in miles per hour (MPH)? (page 33-34)

$$\text{MPH} = \frac{204}{\text{Seconds to travel 300 Feet}} = \frac{204}{51} = \mathbf{4.0}$$

1-4. How many gallons per acre (GPA) (broadcast rate) is applied by a spray rig that travels at **4 miles per hour (MPH)**, delivers **35 ounces per minute**, and has a nozzle spacing of **20 inches** (IN.)? (page 34)

$$\text{Broadcast Spraying GPA} = \frac{\text{Ounces per Minute x } 46.4}{\text{Nozzle Spacing (IN.) x MPH}} = \frac{35 \text{ X } 46.4}{20 \text{ X } 4} =$$

$$\frac{1624}{80} = \mathbf{20.3}$$

1-5. How many gallons per acre (GPA) (broadcast rate) is applied **while banding** by a spray rig that travels at **4** miles per hour (MPH), delivers **31** ounces per minute, and is treating a bandwidth of **12** inches (IN.)? (page 34)

$$\text{Band Spraying GPA} = \frac{\text{Ounces per Minute} \times 46.4}{\text{Bandwidth (IN.)} \times \text{MPH}} = \frac{31 \times 46.4}{12 \times 4} =$$

$$\frac{1{,}438.4}{48} = \mathbf{30.0}$$

1-6. If the label on a **50 %** wettable powder states; use **1.0** pounds of active ingredient per acre, how many pounds of the product are needed to treat one acre? (page 35)

$$\text{Pounds of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient Per Acre}}{\text{Percent Active Ingredient}} =$$

$$\frac{1.0}{0.50} = \mathbf{2}$$

1-7. If a pesticide formulation contains **4.0** pounds of active ingredient (a.i.) per gallon and you want to apply **2.0** pounds of active ingredient per acre, how many gallons of the product are needed to treat one acre? (page 36-37)

$$\text{Gallons of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient per Acre}}{\text{Pounds per Gallon}} =$$

$$\frac{2.0}{4.0} = \mathbf{0.50}$$

1-8. For a spray rig that delivers **25 gallons per acre** (GPA) and has a **200 gallon tank**, how many gallons of a **4 pounds ai per gallon** pesticide must be added to each tank at a rate of **2 pound ai per acre**? (page 36-37)

$$\text{acres sprayed per tank} = \frac{\text{Gallons in tank}}{\text{gallons sprayed per acre}} = \frac{200}{25} = 8$$

$$\text{Gallons of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient per Acre}}{\text{Pounds per Gallon}} = \frac{2}{4} = 0.5$$

purchased material to put in tank = Acres tank will treat X Purchased material per acre = 8 X 0.5 = **4 gallons**

1-9. For a spray rig that delivers **25 gallons per acre** (GPA) and has a **200 gallon tank**, how many pounds of a **50 %** purchased pesticide must be added to each tank at a rate of **1 pound ai per acre**? (page 35 & 37)

$$\text{acres sprayed per tank} = \frac{\text{Gallons in tank}}{\text{gallons sprayed per acre}} = \frac{200}{25} = 8$$

$$\text{Pounds of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient Per Acre}}{\text{Percent Active Ingredient}} = \frac{1.0}{0.50} = 2$$

purchased material to put in tank = Acres tank will treat X Purchased material per acre = 8 X 2 = **16 pounds**

CALIBRATION PRACTICE PROBLEMS

These problems are like the ones in the study manual but the values are different.
The format is similar to the Exam problems but the values are different.

2-1. Calculate the swath width in feet (FT.) if the spray equipment has 8 nozzles on 20 inch (IN.) spacings. (page 32)

2-2. What will the application rate be in gallons per acre (GPA) if 5.0 gallons are used to treat an area 660 feet long and 13.3 feet wide? (page 32-33)

2-3. If an applicators spray equipment travels 300 feet in 68 seconds, what is the speed in miles per hour (MPH)? (page 33-34)

2-4. How many gallons per acre (GPA) (broadcast rate) is applied by a spray rig that travels at 3 miles per hour (MPH), delivers 25 ounces per minute, and has a nozzle spacing of 20 inches (IN.)? (page 34)

2-5. How many gallons per acre (GPA) (broadcast rate) is applied **while banding** by a spray rig that travels at 3 miles per hour (MPH), delivers 25 ounces per minute, and is treating a bandwidth of 12 inches (IN.)? (page 34) (NOTE: Although this is the amount that would be broadcast on 1 acre of treated area a greater number of acres of crop would be treated because of the alternating bands and skips. The number of acres of crop depends on the row spacing and the band with. For example if the row width is 36 inches and the band treated is 12 inches there would be 3 acres of crop for every 1 acre of surface actually treated.)

2-6. If the label on a 75% wettable powder states; use 3.0 pounds of active ingredient per acre, how many pounds of the product are needed to treat one acre? (page 35-36)

2-7. If a pesticide formulation contains 4 pounds of active ingredient (a.i.) per gallon and you want to apply 2.0 pounds of active ingredient per acre, how many gallons of the product are needed to treat one acre? (page 36-37)

2-8. For a spray rig that delivers 15 gallons per acre (GPA) and has a 150 gallon tank, how many gallons of a 2 pounds ai per gallon pesticide must be added to each tank at a rate of 0.5 pound ai per acre? (page 36-37)

2-9. For a spray rig that delivers 20 gallons per acre (GPA) and has a 500 gallon tank, how many pounds of a 75 % purchased pesticide must be added to each tank at a rate of 1.0 pound ai per acre? (page 35 & 37)

ANSWERS:

1. 13.3 feet
2. 24.8 gallons per acre (GPA)
3. 3.0 miles per hour (MPH)
4. 19.3 gallons per acre (GPA) (while making a broadcast application)
5. 32.2 gallons per acre (GPA) (while banding i.e. actually treating 1 acre but covering more acres of crop.
6. 4.0 pounds
7. 0.25 gallons per acre
8. 2.5 gallons
9. 33.3 pounds

CALIBRATION PRACTICE PROBLEM SOLUTIONS

These problems are like the ones in the study manual but the values are different good for practice. The format is similar to the Exam problems but the values are different.

2-1. Calculate the swath width in feet (FT.) if the spray equipment has **8 nozzles** on **20 inch** (IN.) spacings. (page 32)

$$\text{Swath Width (FT.)} = \frac{\text{Number of Nozzles x Nozzle Spacing (IN.)}}{12} =$$

$$\frac{8 \text{ nozzles X } 20 \text{ inches}}{12} = \frac{160}{12} = \mathbf{13.3}$$

2-2. What will the application rate be in gallons per acre (GPA) if **5.0 gallons** are used to treat an area **660 feet long** and **13.3 feet wide**? (page 32-33)

$$\text{GPA} = \frac{43{,}560 \text{ x Gallons Used on area}}{\text{Length (FT.) x Swath Width (FT.)}} = \frac{43{,}560 \text{ X } 5}{660 \text{ X } 13.3} = \mathbf{24.8}$$

2-3. If an applicators spray equipment travels **300 feet in 68 seconds**, what is the speed in miles per hour (MPH)? (page 33-34)

$$\text{MPH} = \frac{204}{\text{Seconds to Travel 300 Feet}} = \frac{204}{68} = \mathbf{3.0}$$

2-4. How many gallons per acre (GPA) (broadcast rate) is applied by a spray rig that travels at **3 miles per hour (MPH)**, delivers **25 ounces per minute**, and has a nozzle spacing of **20 inches** (IN.)? (page 34)

$$\text{Broadcast Spraying GPA} = \frac{\text{Ounces per Minute x } 46.4}{\text{Nozzle Spacing (IN.) x MPH}} = \frac{25 \text{ X } 46.4}{20 \text{ X } 3} =$$

$$\frac{1160}{60} = \mathbf{19.3}$$

2-5. How many gallons per acre (GPA) (broadcast rate) is applied **while banding** by a spray rig that travels at 3 miles per hour (MPH), delivers 25 ounces per minute, and is treating a bandwidth of 12 inches (IN.)? (page 34)

$$\text{Band Spraying GPA} = \frac{\text{Ounces per Minute} \times 46.4}{\text{Bandwidth (IN.)} \times \text{MPH}} = \frac{25 \times 46.4}{12 \times 3} =$$

$$\frac{1{,}160}{36} = \mathbf{32.2}$$

2-6. If the label on a **75 %** wettable powder states; use **3.0** pounds of active ingredient per acre, how many pounds of the product are needed to treat one acre? (page 35-36)

$$\text{Pounds of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient Per Acre}}{\text{Percent Active Ingredient}} =$$

$$\frac{3.0}{0.75} = \mathbf{4}$$

2-7. If a pesticide formulation contains **8.0** pounds of active ingredient (a.i.) per gallon and you want to apply **2.0** pounds of active ingredient per acre, how many gallons of the product are needed to treat one acre? (page 36-37)

$$\text{Gallons of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient per Acre}}{\text{Pounds per Gallon}} =$$

$$\frac{2.0}{8.0} = \mathbf{0.25}$$

2-8. For a spray rig that delivers **15 gallons per acre** (GPA) and has a **150 gallon tank**, how many gallons of a **2 pounds ai per gallon** pesticide must be added to each tank at a rate of **0.5 pound ai per acre**?
(page 36-37)

$$\text{acres sprayed per tank} = \frac{\text{Gallons in tank}}{\text{gallons sprayed per acre}} = \frac{150}{15} = 10$$

$$\frac{\text{Pounds Active Ingredient per Acre}}{\text{Pounds per Gallon}} = \text{Gallons of Pesticide Product per Acre} = \frac{0.5}{2} = 0.25$$

purchased material to put in tank = Acres tank will treat X Purchased material per acre = 10 X 0.25 = **2.5 gallons**

2-9. For a spray rig that delivers **20 gallons per acre** (GPA) and has a **500 gallon tank**, how many pounds of a **75 %** purchased pesticide must be added to each tank at a rate of **1.0 pound ai per acre**? (page 36-37)

$$\text{acres sprayed per tank} = \frac{\text{Gallons in tank}}{\text{gallons sprayed per acre}} = \frac{500}{20} = 25$$

$$\text{Pounds of Pesticide Product per Acre} = \frac{\text{Pounds Active Ingredient Per Acre}}{\text{Percent Active Ingredient}} = \frac{1.0}{0.75} = 1.33$$

purchased material to put in tank = Acres tank will treat X Purchased material per acre = 25 X 1.33 = **33.3 pounds**