

# Overcoming math anxiety

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Science solving problems



*Soils, plants, water, environment,  
planning, production, management*

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## Numbers are important in IPM (Integrated Pest Management)

Pesticides	The law requires applicators to follow the label including rates
Profits	Expensive products should be applied cost effectively
Thresholds	Pest population numbers trigger treatment decisions
Prediction	Degree-day and other mathematical models predict pest outbreak
Cultural	Mowing, watering, and fertilizing accurately reduce pest populations
Financial	Solid budgeting, bidding, and strong margins increase profits
Responsibility	Safety, recordkeeping, and verification of practices reduce liability

## Sample tasks

General	Calculate the area of a job based on rectangles, circles, and triangles
Pesticides	Calibrate a sprayer, calculating carrier volume per area based on ground speed, nozzle discharge rate, and nozzle spacing (ignoring boom width and pressure, and boom height)
Pesticides	Calculate tank mix product (concentrate) amount and diluent (carrier) volume for accurate pesticide application
Irrigation	Program irrigation run times based on precipitation rate
Irrigation	Determine the area that can be supplied by a pump of a certain HP
Fertilization	Determine fertilizer reduction due to nitrate content of reuse water
Cultural	Calculate effective area of penetration by core cultivation

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Common unit conversions: 1 yard=3 feet, 1 foot=12 inches, 1 acre=43,560 square feet, 1 mile=5280 feet, 1 cubic foot water=62.4 pounds, 1 inch=2.54 cm, 1 pound=16 (avoirdupois) ounces, 1 pound=454 g, 1 (avoirdupois) ounce=28.3 grams, 1 m=10 cm, 1 cm=10 mm, 1 km=1000 m, 1 cubic foot=7.48 gallons, 1 gallon=128 liquid ounces, 1 liquid ounce=29.5 cubic centimeters, 1 cubic centimeter water = 1 gram (at 4C), 1 horsepower=33,000 foot-pounds per minute.

**Calculate carrier gallons per acre (GPA) from ground speed, nozzle discharge rate, and nozzle spacing.**

**These first three boxes are what is given to you**

**These three boxes are identities**

Long version

$$\begin{array}{c} \text{Ground speed} \\ \frac{14 \text{ seconds time}}{100 \text{ feet distance}} \end{array} \times \begin{array}{c} \text{Nozzle discharge rate} \\ \frac{45 \text{ ounces discharge}}{30 \text{ seconds time}} \end{array} \times \begin{array}{c} \text{Nozzle spacing} \\ \frac{1}{20 \text{ inches between nozzles}} \end{array} \times \begin{array}{c} \text{Convert volume} \\ \frac{1 \text{ gallon}}{128 \text{ ounces}} \end{array} \times \begin{array}{c} \text{Convert distance} \\ \frac{12 \text{ inches}}{1 \text{ foot}} \end{array} \times \begin{array}{c} \text{Convert area} \\ \frac{43560 \text{ foot} \times \text{foot}}{1 \text{ acre}} \end{array} =$$

Simplified template

$$\begin{array}{c} \text{Ground speed} \\ \frac{\text{seconds}}{\text{feet}} \end{array} \times \begin{array}{c} \text{Nozzle discharge rate} \\ \frac{\text{ounces}}{\text{seconds}} \end{array} \times \begin{array}{c} \text{Nozzle spacing} \\ \text{inches} \end{array} \times \begin{array}{c} \text{Coefficient} \\ 4084 \end{array} = \frac{\quad}{\quad} \text{ gpa}$$

Sample values

$$\begin{array}{c} \text{Ground speed} \\ \frac{14 \text{ seconds}}{100 \text{ feet}} \end{array} \times \begin{array}{c} \text{Nozzle discharge rate} \\ \frac{45 \text{ ounces}}{30 \text{ seconds}} \end{array} \times \begin{array}{c} \text{Nozzle spacing} \\ \frac{1}{20 \text{ inches}} \end{array} \times \begin{array}{c} \text{Coefficient} \\ 4084 \end{array} = \frac{42.88}{\quad} \text{ gpa}$$