

Garden Math Sample Problems and Calculations

[PSS 123 Garden Flowers](#)

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These adaptations of problems from real life should help you with the [homework assignment](#) you'll submit for grading and credit. You should save and print out the [Table of Equivalents](#) which you'll find necessary here, and useful throughout your future gardening, whether at home or professionally.

A couple other hints to make life easier: break the work into parts, and use ratios. For example with parts, if asked to convert mg/l to oz/gal, first convert the mg to oz, and then the L to gal. For ratios, set up the problem such as $1/3 = ?/6$, then cross multiply so $6 = 3x$, then divide each side by 3 giving $2 = x$.

1. The edge of a circular flower bed, 220 ft in diameter, needs mulch. How many cubic yards (yd³) of mulch do you need if you want the mulch to cover 3 ft in from the edge to a depth of 2.5 inches, all the way around?

Diameter = 220 ft

radius = 110 ft.

pi = 3.142

Area of a circle = pi x r²

Area of total bed = $3.142 \times (110)^2 = 38018.2 \text{ ft}^2$

Area of inside bed = $3.142 \times (110-3)^2 = 35972.8 \text{ ft}^2$

Area of ring needing mulch = $38018.2 - 35972.8 = 2045.4 \text{ ft}^2$

Volume of ring (2.5 inches deep = 0.208 ft) = $2045.4 \times 0.208 = 425.4 \text{ ft}^3$

Convert cubic feet to cubic yards → $1 \text{ yd}^3 = 27 \text{ ft}^3$ so $1 \text{ ft}^3 = 0.037 \text{ yd}^3$

$425.4 \times 0.037 = 15.7 \text{ yd}^3 = 16 \text{ yd}^3$

OR

$1 \text{ yd}^3 = 325 \text{ ft}^2$ to 1" deep

$$\frac{325 \text{ ft}^2}{1 \text{ yd}^3} = \frac{2045 \text{ ft}^2}{x}$$

$$325x = 2045 \quad x = 6.29 \quad 6.29 \times 2.5" = 15.75 \text{ yd}^3 = 16 \text{ yd}^3$$

2. You are going to plant a kidney shaped bed with annuals, with each plant 1 ft from the next. The bed width measurements, which were taken every 10 feet, are 11 ft, 13 ft, 5 ft, and 17 ft. Approximately how many annuals will you need to fill the bed?

Area = (add the widths) multiply times feet between each width measurement (you're basically adding up several rectangles, granted the bed edges curve, but the extra plants make up for those on the ends)

Area = $(17 + 5 + 13 + 11) \times 10 = 460$ ft which at 1 ft apart (one sq ft per plant) means 460 annuals

3. How many bags of potting soil would you need to fill 5 very large planters that take 1.75 bushels of potting medium each? Each bag of potting medium is about 3 cubic feet.

1.75 bushels x 5 planters = 8.75 bushels needed

$$\frac{1 \text{ bushel}}{1.25 \text{ ft}^3} = \frac{8.75 \text{ bushels}}{x}$$

$$x = 11 \text{ ft}^3$$

$$\frac{11 \text{ ft}^3}{3 \text{ ft}^3} = 4 \text{ bags}$$

4. You read a fertilizer recommendation for flower gardens and want to try it in your own. Your garden area is 1545 square feet and the recommendation is for 2050 pounds per hectare. How much fertilizer will you need?

To convert square ft to acres \rightarrow multiply by 2.296×10^{-5}
 $1545 \text{ ft}^2 \times (2.296 \times 10^{-5}) = 0.035$ acres

To convert acres to hecatres

$$\frac{1 \text{ acre}}{0.4047 \text{ ha}} = \frac{0.035}{x} \quad x = 0.014 \text{ ha}$$

$$\frac{2050 \text{ lbs}}{1 \text{ ha}} = \frac{x}{0.014 \text{ ha}} \quad x = 28.7 \text{ lbs} (= 29 \text{ lbs})$$

5. How much of ProGro, a 5-3-4 organic fertilizer, do you need to get the same amount of phosphorus (P_2O_5) as if you were using 15 pounds of a 15-10-10 chemical fertilizer?

5-3-4 fertilizer = 3% P_2O_5

15-10-10 fertilizer = 10% $P_2O_5 \rightarrow 15 \text{ lbs} \times 10\% = 1.5 \text{ lbs of } P_2O_5$

$$3\% \text{ times } x \text{ lbs in 5-3-4} = 1.5 \text{ lbs } P_2O_5 \text{ in 15-10-10} \quad x = 50 \text{ lbs } P_2O_5$$

6. A gardener applies a dry 20-10-20 fertilizer to her flower beds, using 2 pounds of potassium (K₂O) per 1000 square feet, 2 times a year. If a 50 lb bag of this fertilizer costs \$9.50, how much is this gardener paying a year for this application?

20-10-20 fert. = 20% K₂O → 20% x = 2 lbs x = 10 lbs 20-10-20 times twice a year = 20 lbs
20-10-20

$$\frac{50}{9.50} = \frac{20}{x} \quad 50x = 190 \quad x = \$3.80$$

7. You only have access to measuring devices that are in mL and liters but you know you need 4 teaspoons per gallon of a liquid fertilizer. How many mL per liter is that?

1 L = 0.264 gal 1 tsp = 5 mL → 4 tsp = 20 mL

$$\frac{x \text{ mL}}{0.264 \text{ gal}} = \frac{20 \text{ mL}}{1 \text{ gal}} \quad x = 20 * 0.264 = 5.28 \text{ mL/L}$$

8. Your dry fertilizer recommendation calls for 7 ounces per gallon, or how many grams per liter is that?

1 oz = 28.35 g → 7 oz = 198.45 g 1 L = 0.264 gal

$$\frac{198.45 \text{ g}}{1 \text{ gal}} = \frac{x \text{ g}}{0.264 \text{ gal}} \quad x = 198.45 * 0.264 = 52.39 \text{ g/L}$$

9. Your recipe for potting mix calls for 4 pounds per cubic yard of one of the fertilizer ingredients. You are only making 4 1/2 cubic feet. How many grams of this ingredient do you need to add?

1 lb = 453.6 g → 4 lbs = 1814.4 g 1 ft³ = 0.037 yd³ → 4.5 ft³ = 0.1665 yd³

$$\frac{1814.4 \text{ g}}{1 \text{ yd}^3} = \frac{x \text{ g}}{0.1665 \text{ yd}^3} \quad x = 302.09 \text{ g} / 4.5 \text{ ft}^3$$

$$\text{OR } \frac{1814.4 \text{ g}}{1 \text{ yd}^3} = \frac{x \text{ g}}{0.037} \quad x = 67 \rightarrow 67 * 4.5 = 301.5 \text{ g} / 4.5 \text{ ft}^3$$

10. You have a pesticide sprayer that holds 70 quarts but your directions for a botanical pesticide are to mix it at a rate of 8 fluid ounces per 100 gallons. How much do you need to mix for your sprayer?

$$\frac{1 \text{ gal}}{4 \text{ qt.}} = \frac{x \text{ gal}}{70 \text{ qt.}} \quad 4x = 70 \quad x = 17.5 \text{ gal}$$

$$\frac{8 \text{ fl oz}}{100 \text{ gal}} = \frac{x \text{ fl oz}}{17.5 \text{ gal}} \quad 100x = 140 \quad x = 1.4 \text{ fl oz.}$$

11. You see a recommendation for a horticultural oil spray for mildew of 12ml/L. How many Tablespoons (Tbsp)/gallon is this? 3.785L in gal

$$\frac{12 \text{ ml}}{1 \text{ L}} = \frac{x \text{ ml}}{3.785 \text{ L}} \quad x=45 \text{ ml/gal}$$

$$\frac{5 \text{ ml}}{1 \text{ tsp}} = \frac{45 \text{ ml}}{x \text{ tsp}} \quad x=9 \text{ tsp/gal}=3 \text{ Tbsp/gal} \quad (3 \text{ tsp}=1 \text{ Tbsp})$$

12. You begin work in a greenhouse and are asked to make up a 100ppm (part per million) nitrogen (N) solution of fertilizer using 20-10-20. How many ounces of fertilizer will you add for 100 gallons to get the 100ppm N?

1ppm=1 mg/L so 100ppm=100mg of N needed/L but the fertilizer is 20%N, so

$$\frac{100 \text{ mg fert}}{20 \text{ mg N}} = \frac{x \text{ mg fert}}{100 \text{ mg N}} \quad x=500 \text{ mg fertilizer needed/L}$$

$$\frac{500 \text{ mg}}{1 \text{ L}} = \frac{x \text{ mg}}{3.785 \text{ L (gal)}} \quad x=1892.5 \text{ mg}=1.89 \text{ g/gal times } 100 \text{ gal} = 189 \text{ g}/100 \text{ gal}$$

$$\frac{28.35 \text{ g}}{1 \text{ oz}} = \frac{189 \text{ g}}{x \text{ oz}} \quad x=6.7 \text{ oz}/100 \text{ gal}$$

13. How much actual P is in a 80lb bag of 15-30-15 fertilizer?

as you probably know, the numbers stand for %N-%P₂O₅-%K₂O, so you have to convert to actual P and K

$$\frac{100 \text{ lbs fert}}{30 \text{ lbs P}_2\text{O}_5} = \frac{80 \text{ lbs fert}}{x \text{ lbs P}_2\text{O}_5} \quad x=24 \text{ lbs P}_2\text{O}_5 \text{ or alternately } 30\% \text{ times } 80= 24$$

from Equivalents table you see that P x 2.3 = P₂O₅ so P₂O₅ divided by 2.3 = P, or 24/2.3= 10.4 lbs P in the 80 lb bag
