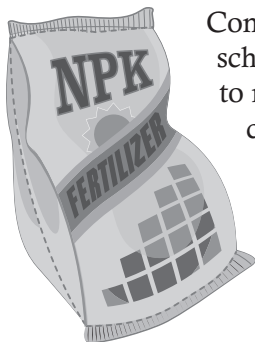


# Concentrate on the Solution

Name: \_\_\_\_\_



Congratulations! You have been appointed as one of the managers in charge of your school farm. This job takes the place of one of your elective classes this year. Your job is to monitor, manage, and supply the nutrients needed to produce a high-quality vegetable crop. Vegetables from your school farm are sold each week at your local farmers market to raise money for school field trips, clubs, and sports. Your teacher has submitted soil samples to the lab and results show various nutrient deficiencies. You have been instructed to analyze the following information to show your teacher that you are ready to tackle the responsibilities of your new job and are prepared to develop a solution to your nutrient deficiency problems.

## Our Challenge

Nutrient deficiency: \_\_\_\_\_

Supplemental nutrient amount needed: \_\_\_\_\_

## Step 1

Look at the possible fertilizer compounds on the chart. Select two compounds that you think would supplement the nutrients you need.

Find the molecular mass of each of your chosen fertilizer compounds. Do this by adding the individual atomic weights for each element. (Show your work)

Compound \_\_\_\_\_

Compound \_\_\_\_\_

Molecular mass \_\_\_\_\_

Molecular mass \_\_\_\_\_

## Concentrate on the Solution *(continued)*

### Step 2

Once you have the molecular mass of your compound, find out what percent of the compound is made up of the desired nutrient by weight. For example, if your compound molecular mass is 100 and the atomic weight of calcium in the compound is 40, then calcium = 40% of your fertilizer compound. (Show your work)

$$\frac{\text{_____}}{\text{nutrient}} = \text{_____} \% \text{ of } \frac{\text{_____}}{\text{fertilizer compound}}$$

$$\frac{\text{_____}}{\text{nutrient}} = \text{_____} \% \text{ of } \frac{\text{_____}}{\text{fertilizer compound}}$$

Assume that both fertilizer compounds are sold for the same price. Which compound provides the best value for your specific nutrient deficiency?

---

---

### Step 3

What solute to solvent ratio will you use to prepare the fertilizer concentration needed? (Show your work)

$$\frac{\text{desired concentration of nutrient}}{\% \text{ nutrient in compound (decimal)}} = \frac{\text{unknown concentration (x) of fertilizer compound}}{\% \text{ total compound (decimal)}}$$

How many mg of the solvent will you need to add to make 1 L of the fertilizer solution to be applied to your plants? Note: ppm = mg/l

*Example: if you need 150 ppm of Calcium and your percentage of calcium in the fertilizer compound is 10%, how many mg of fertilizer compound do you need per liter of water?*

*150 ppm Ca ÷ .10 Ca = 1,500 ppm = 1,500 mg of fertilizer per liter of water.*

Explain your next steps after preparing this fertilizer solution along with any additional information you might need about the farm before taking action.

---

---

---

## **Concentrate on the Solution** *(continued)*

### **Step 4**

You have a great opportunity for a summer job at a local farm. Your potential boss wants you to demonstrate your skills for communicating clear instructions to employees who may be working as your assistants. Your teacher suggests that you write up a detailed description of how you solved the nutrient deficiency problem for the school farm. Your answer should defend your choice of fertilizer compound and provide an explanation of how to prepare the fertilizer solution. Directions should be easily followed by an entry level employee who has very little knowledge of fertilizer components and preparation.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

**Congratulations, your experience working on the school farm has earned you an interview for a summer job with a local farm. Answer the following questions to prepare for the interview:**

1. The farm has two different fertilizers in the barn. One is  $K_2SO_4$  and the other is  $KCl$ . The two fertilizers cost the same per ton, but we want to be conscious of costs by using the fertilizer with the highest percentage of potassium, since we won't have to apply as much. Which fertilizer should we use? Show your calculations.

**Concentrate on the Solution** *(continued)*

2. Animal manures are often used to add nutrients to soil. Assume that the average price for chicken manure is \$30 per ton (*cost is an estimate only*) and contains 31 pounds of nitrogen per ton.
  - ▶ What percentage of nitrogen does the manure contain? \_\_\_\_\_
  - ▶ What is the cost per pound of nitrogen? \_\_\_\_\_
  
3. Ammonium nitrate contains 35% nitrogen, so a ton of ammonium nitrate would contain 700 pounds of nitrogen. Assume ammonium nitrate costs \$300 per ton, what is the cost per pound of nitrogen?
  
4. Which is more cost effective to apply, chicken manure or ammonium nitrate?
  
5. What are some issues other than price that might affect which of the fertilizers a grower would choose to use?
  
  
  
  
  
  
  
  
  
  
  
  
  
  
6. What types of valuable experience might you gain during a summer job at the farm?