SAVVAS

Math Support

FLORIDA

Experience Chemistry®

Master Math in Chemistry in 4 Steps

Crack the code! *Florida Experience Chemistry*® supports every student in building a solid foundation in mathematics for chemistry with step-by-step guidance in every Experience (lesson).

Step 1: Analyze the Problem

Identify key elements within the problem to help students grasp the fundamentals. The **Sample Problem** guides you through each component, so that you have a comprehensive understanding of the problem.

SAMPLE PROBLEM

Finding Mass From a Count

What is the mass of 90 apples if 1 dozen of the apples has a mass of 2.0 kg?

ANALYZE List the knowns and the unknown.

Knowns	Unknown
number of apples = 90	mass of 90 apples = ? kg
12 apples = 1 dozen apples	
1 dozen apples = 2.0 kg apples	

CALCULATE Solve for the unknown.

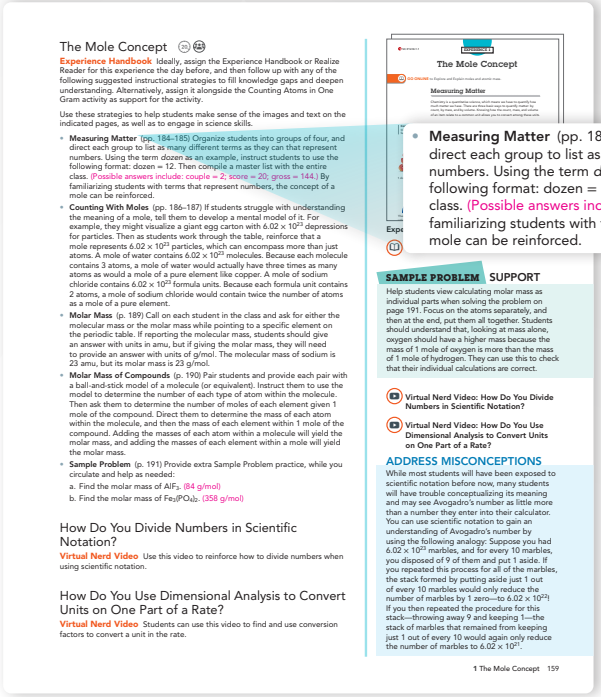
Identify the steps to convert from number, or count, to mass. → number of apples → dozens of apples → mass of apples

Multiply the number of apples by the two conversion factors needed to convert from number of apples to mass of apples.

$$90 \text{ apples} \times \frac{1 \text{ dozen apples}}{12 \text{ apples}} \times \frac{2.0 \text{ kg apples}}{1 \text{ dozen apples}} = 15 \text{ kg apples}$$

EVALUATE Does the result make sense?

A dozen apples has a mass of 2.0 kg, and 90 apples is less than 10 dozen apples, so the mass should be less than 20 kg of apples (10 dozen × 2.0 kg/dozen).



The Mole Concept

Experience Handbook Ideally, assign the Experience Handbook or Realize Reader for this experience the day before, and then follow up with any of the following suggested instructional strategies to fill knowledge gaps and deepen understanding. Alternatively, assign it alongside the Counting Atoms in One Gram activity as support for the activity.

Use these strategies to help students make sense of the images and text on the indicated pages, as well as to engage in science skills.

- **Measuring Matter** (pp. 184–185) Organize students into groups of four, and direct each group to list as many different terms as they can that represent numbers. Using the term *dozen* as an example, instruct students to use the following format: dozen = 12. Then compile a master list with the entire class. (Possible answers include: couple = 2; score = 20; gross = 144.) By familiarizing students with terms that represent numbers, the concept of a mole can be reinforced.
- **Counting With Moles** (pp. 186–187) If students struggle with understanding the meaning of a mole, tell them to develop a mental model of it. For example, they might visualize a giant egg carton with 6.02×10^{23} depressions for particles. Then as students work through the table, reinforce that a mole represents 6.02×10^{23} particles, which can encompass more than just atoms. A mole of water contains 6.02×10^{23} molecules. Because each molecule contains 3 atoms, a mole of water would actually have three times as many atoms as would a mole of a pure element like copper. A mole of sodium chloride contains 6.02×10^{23} formula units. Because each formula unit contains 2 atoms, a mole of sodium chloride would contain twice the number of atoms as a mole of a pure element.
- **Molar Mass** (p. 189) Call on each student in the class and ask for either the molecular mass or the molar mass while pointing to a specific element on the periodic table. If reporting the molecular mass, students should give an answer with units in amu, but if giving the molar mass, they will need to provide an answer with units of g/mol. The molecular mass of sodium is 23 amu, but its molar mass is 23 g/mol.
- **Molar Mass of Compounds** (p. 190) Pair students and provide each pair with a ball-and-stick model of a molecule (or equivalent). Instruct them to use the model to determine the number of each type of atom within the molecule. Then ask them to determine the number of moles of each element given 1 mole of the compound. Direct them to determine the mass of each atom within the molecule, and then the mass of each element within 1 mole of the compound. Adding the masses of each atom within a molecule will yield the molar mass, and adding the masses of each element within a mole will yield the molar mass.
- **Sample Problem** (p. 191) Provide extra Sample Problem practice, while you circulate and help as needed:
  a. Find the molar mass of AlF_3. (84 g/mol)
  b. Find the molar mass of $Fe_3(PO_4)_2$. (358 g/mol)

How Do You Divide Numbers in Scientific Notation?

Virtual Nerd Video Use this video to reinforce how to divide numbers when using scientific notation.

How Do You Use Dimensional Analysis to Convert Units on One Part of a Rate?

Virtual Nerd Video Students can use this video to find and use conversion factors to convert a unit in the rate.

Measuring Matter (pp. 184–185) Organize students into groups of four, and direct each group to list as many different terms as they can that represent numbers. Using the term *dozen* as an example, instruct students to use the following format: dozen = 12. Then compile a master list with the entire class. (Possible answers include: couple = 2; score = 20; gross = 144.) By familiarizing students with terms that represent numbers, the concept of a mole can be reinforced.

SAMPLE PROBLEM SUPPORT

Help students view calculating molar mass as individual parts when solving the problem on page 191. Focus on the atoms separately, and then at the end, put them all together. Students should understand that, looking at mass alone, oxygen should have a higher mass because the mass of 1 mole of oxygen is more than the mass of 1 mole of hydrogen. They can use this to check that their individual calculations are correct.

Virtual Nerd Video: How Do You Divide Numbers in Scientific Notation?

Virtual Nerd Video: How Do You Use Dimensional Analysis to Convert Units on One Part of a Rate?

ADDRESS MISCONCEPTIONS

While most students will have been exposed to scientific notation before now, many students will have trouble conceptualizing its meaning and may see Avogadro's number as little more than a number they enter into their calculator. You can use scientific notation to gain an understanding of Avogadro's number by using the following analogy: Suppose you had 6.02×10^{23} marbles, and for every 10 marbles, you disposed of 9 of them and put 1 aside. If you repeated this process for all of the marbles, the stack formed by putting aside just 1 out of every 10 marbles would only reduce the number of marbles by 1 zero—to 6.02×10^{22}! If you then repeated the procedure for this stack—throwing away 9 and keeping 1—the stack of marbles that remained from keeping just 1 out of every 10 would again only reduce the number of marbles to 6.02×10^{21}.

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Step 2: Solve with Precision

Apply mathematical concepts and skills to interpret the problem with accuracy. Clear, **step-by-step instructions** help you demonstrate problem-solving with ease.

Step 3: Use Math Support Callouts

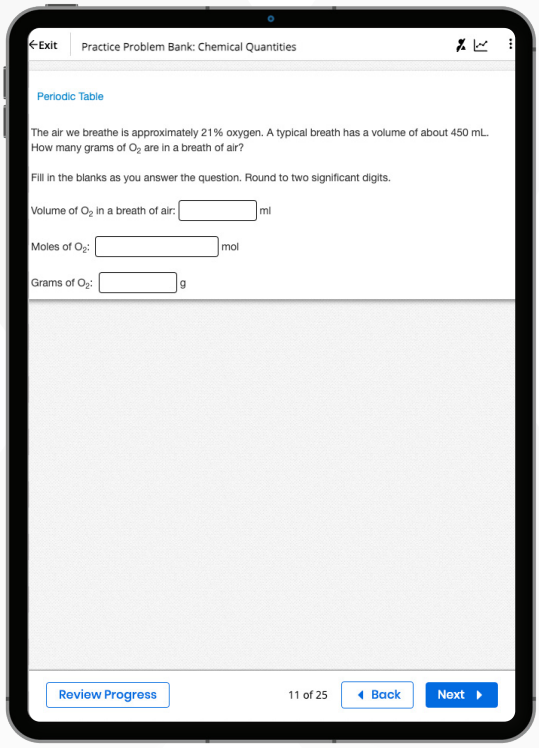
Access the **Sample Problem Support** and **Integrate Math** callouts for instant assistance. These are strategically placed throughout the lesson to help you better understand how to facilitate or simplify challenging concepts for your students in real-time.

SAMPLE PROBLEM SUPPORT

Help students view calculating molar mass as individual parts when solving the problem on page 191. Focus on the atoms separately, and then at the end, put them all together. Students should understand that, looking at mass alone, oxygen should have a higher mass because the mass of 1 mole of oxygen is more than the mass of 1 mole of hydrogen. They can use this to check that their individual calculations are correct.

INTEGRATE MATH

When calculating density using a formula, students might easily view these types of problems as they would any other math problem. But solving math-related problems in science has an added advantage in that it is often possible to verify an answer by looking at real-world phenomenon. When calculating the density of a gas, students can often verify if their answer is correct by comparing its density to that of air (1.23 g/L). If a gas, like helium, has a lower density than air, it will rise. Always encourage students to check their answers for reasonableness.



Step 4: Go Online for More Practice

Log in to **SavvasRealize.com** to reinforce these skills with additional practice problems from the **Practice Problem Bank** or assign **Virtual Nerd® Videos** to students to strengthen their understanding and confidence in applying math in chemistry.

VirtualNerd™

- **Virtual Nerd Video: How Do You Divide Numbers in Scientific Notation?**
- **Virtual Nerd Video: How Do You Use Dimensional Analysis to Convert Units on One Part of a Rate?**

Learn more or contact your Savvas Representative for expert support.
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