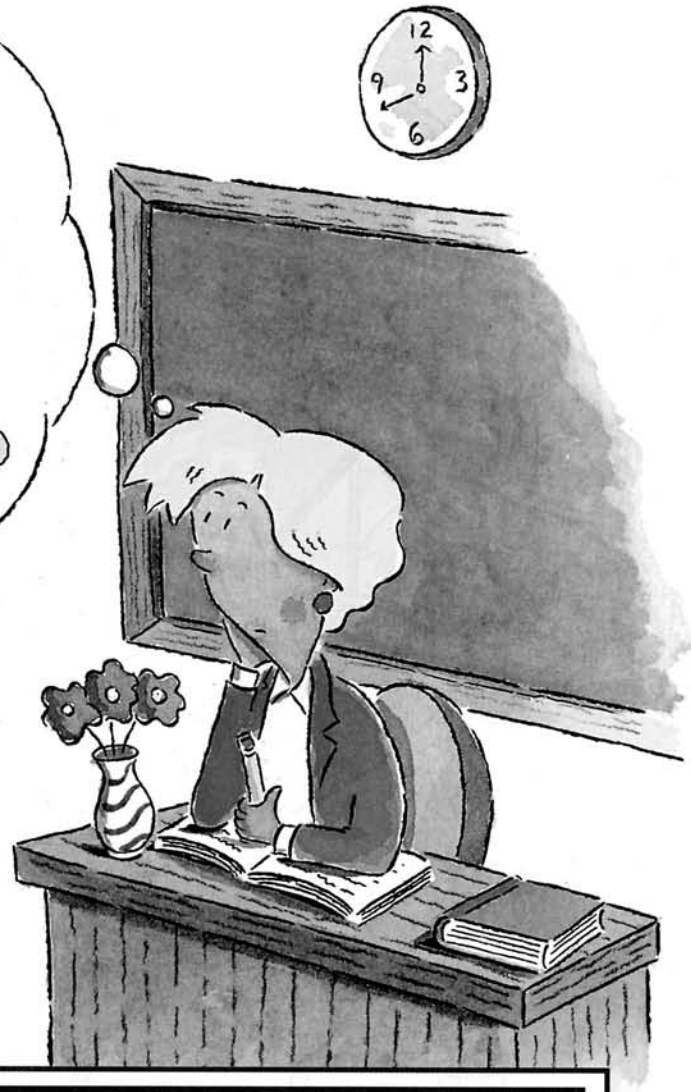
Can I Balance Arithmetic Instruction with Real-Life Math?



Marilyn Burns shows you how

Arithmetic is one of the time-honored three R's. While geometry, patterns, and probability are all part of the elementary math curriculum, it's arithmetic that receives the most attention. And this has never been truer than now.

While parents clamor for schools to get back to basics, deciding how to teach arithmetic has fueled heated discussions in faculty rooms and PTA meetings nationwide. Just ask, "What should arithmetic instruction look like in the classroom?" and the battle lines are drawn.

In one camp, parents and teachers frown on too many hands-on activities and instead favor paper-and-pencil exercises. On the opposing side, parents and educators argue that skill-and-drill arithmetic hinders true understanding. They favor arithmetic instruction that's grounded in problem solving.

What's a teacher to do? Marilyn Burns, a teacher and math innovator, has found a middle ground. Here, she outlines why it's important to teach arithmetic and shows you how to match what you're teaching with children's real-world needs.

Basic Math Skills for the 21st Century

Computational proficiency with paper and pencil is no longer the acceptable minimum standard for arithmetic competency. Basic arithmetic skills must be broadened and reflect more rigor, preparing students not only to develop skills but to learn to apply them in new, different, and more complex situations. Students must be able to:

- identify the operations called for in problem situations.
- choose the numbers to use.
- do the calculation using an appropriate method—mentally, with paper and pencil, or on a calculator.
- evaluate how reasonable an answer is, and decide what action to take if it's not reasonable.

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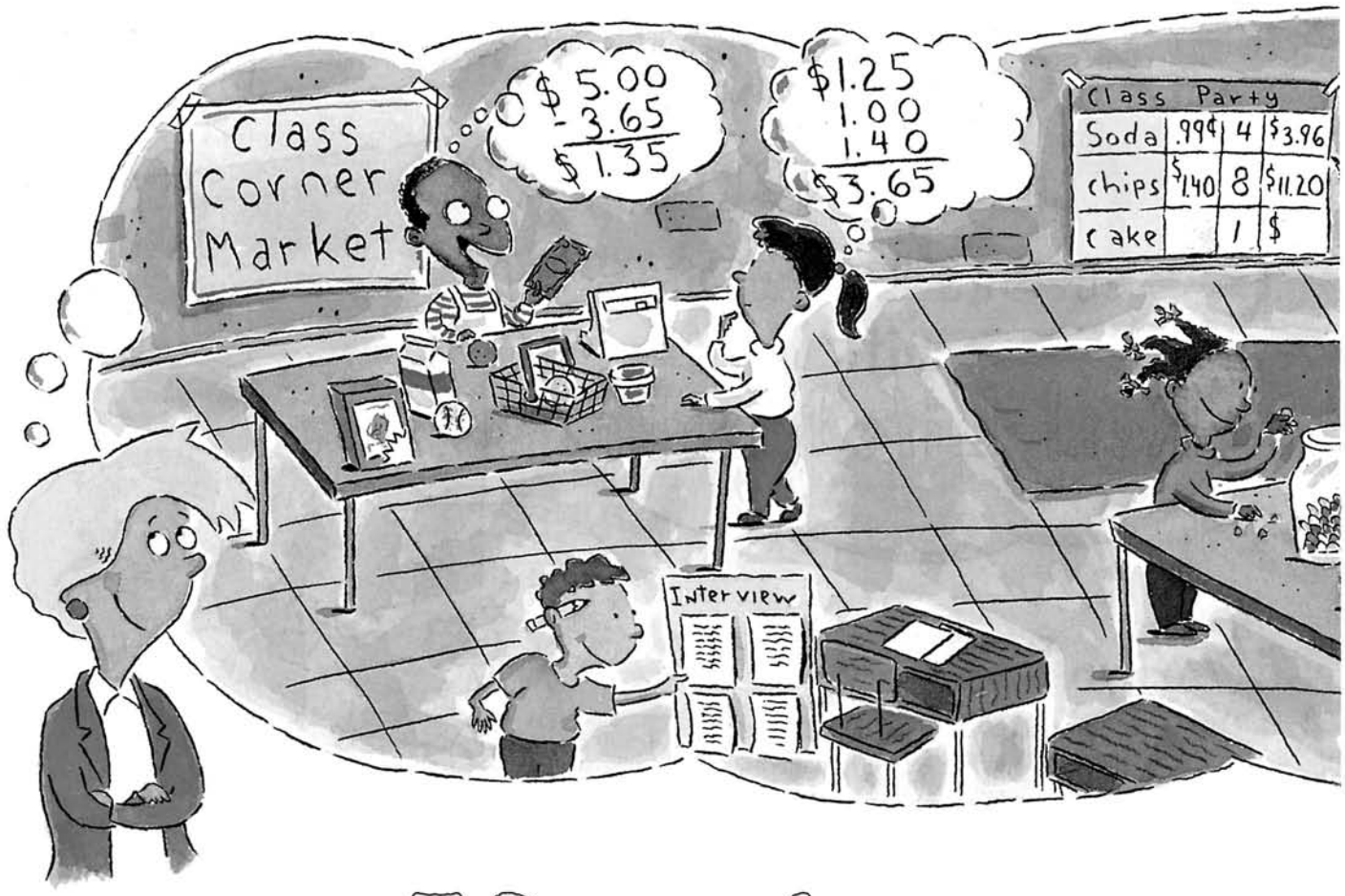


7 Basics for Teaching Arithmetic Today

Plus 7 Classroom Strategies

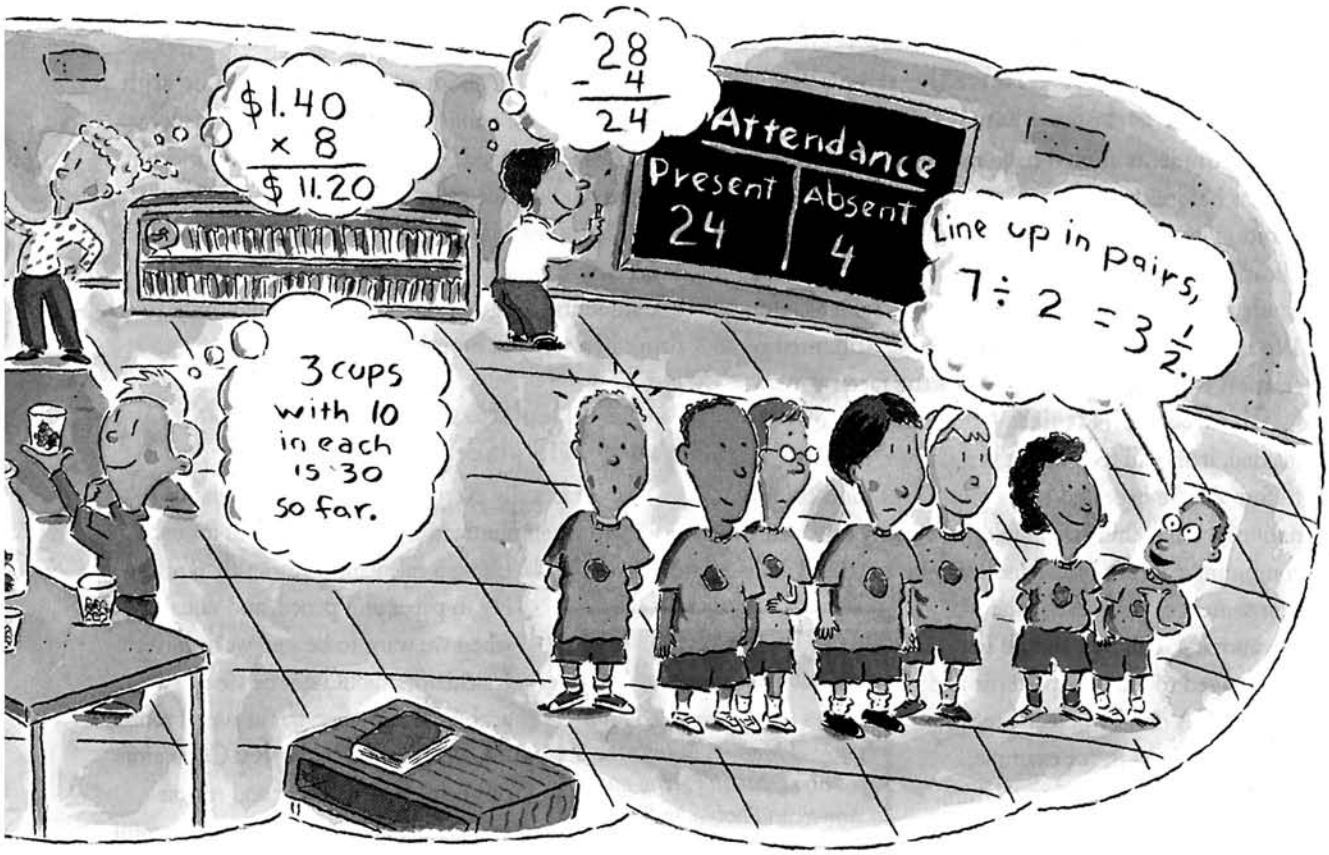
1 Arithmetic skills are necessary life tools that children must learn.

As adults, we use arithmetic daily. We add, subtract, multiply, or divide when we balance our checkbooks, calculate tips in restaurants, figure out how much wallpaper to buy, finance a car, keep score for games, and so on. A person who can't do arithmetic is handicapped in many situations.

Classroom strategies: To help children appreciate the importance of arithmetic, ask them to interview their families about when they use arithmetic. The question they should ask is: When do you have to add, subtract, multiply, or divide to find out something you need to know? Record what children report on a class chart. (For older children, sort the information into two groups "at work" and "at home.") Afterward, discuss how the chart shows that arithmetic has many useful purposes.

2 Arithmetic should prepare children for real-world math.

Almost all of the daily situations that require arithmetic call for more than merely computing. For example, we need to problem-solve in order to decide on the numbers to use or which operation to choose.



Illustrations: Michael Moran

Classroom strategies: Involve children in solving problems that relate to classroom routines, such as:

- ✔ When taking attendance, count children present, then ask the class to figure out how many are absent.
- ✔ Ask children, when lining up, to predict whether everyone will have a partner.
- ✔ When collecting milk money, involve students in making change and figuring out how much everyone spends on milk altogether.
- ✔ Involve older students in figuring out how much classroom supplies cost, such as a year's supply of paper.
- ✔ For class parties, have the students figure out how much refreshments will cost.

3 Learning to compute mentally is an essential skill.

We do many of our daily arithmetic calculations mentally, such as when we keep track of what we put in the supermarket cart so we don't go over the $20 we have, when we divide a check at a restaurant, or when we double a recipe that calls for 3/4 of a cup of broth. Usually we don't reach for paper and pencil, but figure in our heads.

Classroom strategies: Ask children to do mental math on a regular basis. Call it "hands-on-the-table" math and ask children not to reach for paper or pencil, but to reason in their heads. Try this:

For younger students: Have two children take a handful of beans or tiles and count how many they have. Ask the class to figure out how many they have together. To verify, count the objects. Or ask each student to put two cubes in a jar and then have the class figure the number of cubes in the jar altogether. To verify, count the cubes by 2s, 5s, and 10s. (Not all young children know that you'll get the same result no matter how you count.)

For older students: Scoop beans into a jar using a coffee scoop and have the students count how many scoops it takes to fill the jar. Then give pairs of students a scoop of beans to count, discuss with the class what might be the average number of beans in a scoop, and then have students calculate mentally how many beans are in the jar.

4 To calculate efficiently, it's important to know basic facts.

Students should have math facts at their fingertips before they leave elementary school, such as addition and subtraction combinations to 20, multiplication tables to 12 x 12, and related division facts. Students learn some of the facts easily, such as adding 1 to any number or doubling numbers. Still, memorization is necessary to learn all of the facts.

Classroom strategies: While memorization is needed, it should follow, not precede, understanding. Before they're expected to memorize addition combinations, young children should have many experiences combining sets of objects and learning to record addition sentences. And even when memorizing, children should be encouraged to look for patterns and to reason. A child who can't recall how much 8 x 4 is, for example, should be encouraged first to think about something familiar, like 8 x 2 or 4 x 4, and then use that information to figure out 8 x 4.

5 Students need to know when accuracy is essential and when estimates will suffice.

When we balance our checkbooks or make change, accuracy is important. But in many situations, estimates will do, such as when we double the amount of broth for a recipe or measure fertilizer for the lawn. Sometimes estimates are the only answers possible, such as when contractors bid for jobs, business owners figure margins of profit, or school districts predict the next year's budget.

Classroom strategies: While knowing how to calculate accurate answers is important, students also need experience estimating and learning when estimates are appropriate. Have students review the list they compiled about when their families do arithmetic. Then talk about when accurate answers or estimates are needed. Also, provide opportunities for children to practice estimating. For example, give prices for several items and have them figure out the smallest bill they could use—a $5, $10, or $20. Or ask students to figure out about how much milk they drink in a week, a month, or a year.

6 Calculators are basic tools that have their place in the classroom.

Practically everyone today has a calculator. We use them when numbers are too complicated for us to do in our heads. Using a calculator is easier than resorting to paper and pencil, and valuable when we want to be sure we're correct. Calculators should not be viewed as arithmetic crutches, but as useful tools.

Classroom strategies: Calculators can help children think and reason numerically. For example, they're useful for introducing decimals. Third graders can explore equations like 5 x __ = 24 or 3 x __ = 40 with the help of a calculator, and learn how decimals work.

7 There are different ways to reason numerically.

Ask adults to double 38 in their heads, and you're sure to hear several different methods. Some add 30 and 30 and then add on 16. Some double 40 and subtract 4. Some double 35 and add 6. Some think about multiplying, not adding. There's no one best way.

Classroom strategies: Give students opportunities to discuss different ways to compute. With young children, for example, have them think about all the different ways they can add two numbers. Older students can talk about different ways to add or multiply two-digit numbers. Have all students who volunteer explain their reasoning aloud so students can learn from one another.

Win this Book!

Here's your chance to win a copy of Marilyn Burns's latest book, *Math: Facing an American Phobia*. In this book, Marilyn looks at why more than two-thirds of American adults fear and loathe mathematics, and tells how to help children from adopting the same negative attitudes. For a chance to win a copy, send a postcard with your name, school address, and the grade you teach by May 1, 1998, to Marilyn Burns Giveaway, Instructor, Scholastic, 555 Broadway, New York, NY 10012. Ten winners will be selected at random.