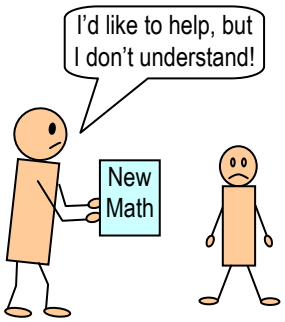
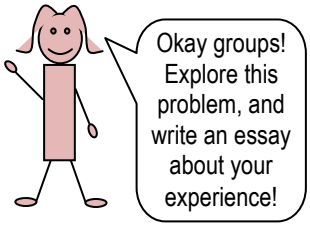
Math Issues

Learning issues confronting students, parents, and teachers.

New Math

In the 1960s, embroiled in the space race with the [then] Soviet Union, there was great concern that American students were falling behind in math. So educators got together to change the way math was taught. "New Math" emphasized set theory and concepts over traditional drill & practice. Befuddled parents didn't understand the "new" math and could no longer help their kids with homework. When math performance didn't improve, the pendulum swung back to more traditional methods.



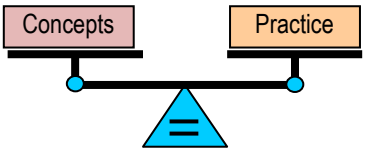


Whole Math (aka New-New Math)

In the 1990s, concerned that America's math scores lagged other industrialized nations, educators got together once again to change the way math was taught. "Whole Math" emphasized group work and discussion, essays, calculators, and estimating vs. drill & practice. When math performance didn't improve, the pendulum again swung back to more traditional methods.

A Balanced Approach

Similar to the debate between Whole Language (reading for meaning) and Phonics (sounding out words through drill & practice), the optimum approach for math instruction lies somewhere between the extremes. Whole Math's premise that understanding concepts will carry students further than rote memorization has merit. But the traditional approach is also correct that drill & practice is necessary for math mastery.



In the lessons that follow, the goal is to balance the two extremes by presenting underlying concepts in memorable ways, typically through stories and analogies, then offering innovative problem-solving techniques that reduce the amount of drill & practice necessary to achieve mastery.

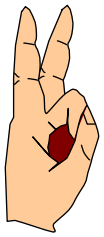
My kid is still not interested!

Don't be surprised if students don't rush to embrace math regardless of the method followed. Math is not easy and kids often don't see how what they're learning today will be of use to them as adults. (Did you?)

If you're a parent who wants to help, learn the techniques presented in these lessons on your own, then teach them to your child. Until they gain confidence, most kids learn better by being *shown* how to do something rather than having to read about and figure it out on their own.

As kids age, they may resist your efforts to help. In this case, an outside tutor or a math-savvy relative or acquaintance may have better luck.

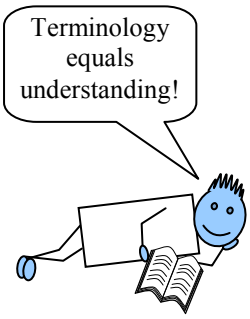
But that's not the way I learned it!



Twice done is well done!

If you or your student question the value of learning the alternate techniques presented in these lessons, consider Ben Franklin's maxim: *Twice done is well done!* Applied to math, this means that if you have time, especially on a test, attempt to solve each problem *twice*.

The trouble is, if you use the *same* technique both times, you're likely to repeat the *same* errors you made the first time. But if you use an alternate technique and your answers agree, you'll be more confident in the result. If a teacher insists on a particular method, of course use it—he or she determines grades. But if time permits, check your work on scratch paper using an alternate method.



Why must I learn terminology?

Terminology is the foundation for success with math or any subject.

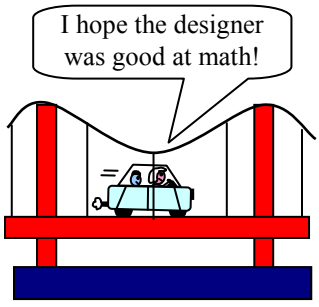
Take the instruction "Factor the expression." Very few students can reliably define *factor* or *expression*. So they mimic the book's or teacher's examples, which may be enough to complete the current task or pass the next test but does little good in the future when no examples are given.

To help you remember terminology, these lessons contain inventive definitions. For example, Factors are Fragments (of combined items) and Expressions are Exclamations (shouted out by combined numbers and/or variables). "Factor the expression" means to extract the common fragments from a combination of numbers and/or variables.

My teacher gives us credit for effort.

Teachers may give credit for "effort" to encourage and reward students for trying in what is a difficult subject for most. But knowing they'll get credit regardless, many students learn to write down anything, with only halfhearted attempts to get the right answers. Since most teachers have too many students to check each one's work thoroughly, the unfortunate outcome is that students can gather enough homework or "effort" points to pass a class without really knowing how to do the math being taught.

Effort is admirable, but you still have to know how to do the math!



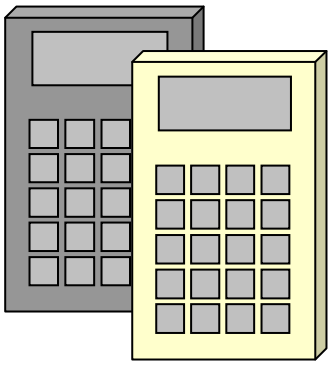
Right answers matter!

Math depends on *right* answers. In some cases, it can be a matter of life or death. If you're driving your car across a bridge, you want to know that the designer got the *right* answers when calculating its load-bearing capacity. If you're flying cross country, you want to know that the flight engineers got the *right* answers when calculating the amount of fuel needed to reach your destination.

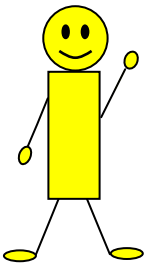
Of course, wrong answers in school aren't life threatening, but they can mean the difference between passing or failing, which can have serious long-term academic and ultimately career consequences.

What about calculators?

The pendulum has swung back and forth on the use of calculators. Some educators figured that once kids learned the principles, they should use calculators for computation and reserve their brainpower for more advanced procedures. This lead to an overdependence where even simple problems like 2 × 10 got mindlessly punched into the calculator.



Some schools overreacted by banning *all* calculator use, and students were forced to manually perform calculations like 25793 ÷ 987 instead of using that time to master new procedures. As usual, the best solution is a compromise: Perform simpler computations mentally or manually; use calculators for more complex calculations.



Estimate a solution to make sure your answer is reasonable.

Double Check your work using an *alternate method* when possible.

We're all error prone!

Humans make mistakes all the time. Most are inconsequential, like dropping an empty plastic cup on a soft carpet. But some mistakes make a dramatic difference, like dropping a full glass of juice and having it shatter on a hard tile floor.

Even the best mathematicians make mistakes, and they're usually simple ones like transposing numbers (e.g., 43 for 34), making arithmetic errors (e.g., 2×3 = 5), overlooking a negative sign, or misplacing a decimal point. But simple errors can have major consequences, like a space probe crashing into Mars instead of making the intended soft landing. (This really happened!)

So expect to make errors, but also do what the best mathematicians do to minimize them: Estimate & Double Check.

Attitude & Math

More so than with most academic subjects, feelings and attitudes play a big part in your success or failure with math.

Believe it or not, many competent math teachers, engineers, and scientists initially struggled with math. But once they "got it" they found it enjoyable and chose careers that embodied math.

If math makes you feel stupid, you have a choice!

Math makes me feel stupid!

So I avoid it at all costs!

Math makes me feel stupid!

So I persist until I get it!