# *Chapter 5:*
# Math, Equations, and Willy Wonka's Chocolate Factory

THERE IS POWER IN SIMPLICITY.

### Elementary School Math Class Distress

Like reading and writing, the third "R," 'rithmetic, frustrated me. At a simple level, I didn't understand for the longest time why these subjects were called "the three R's." My teachers would tell my parents, "He's failing the three R's." Even if I overlooked the fact that "writing" doesn't begin with an "R," I could at least make some sense of the fact that it sounds as though it ought to. The third "R," however, was bewildering since "arithmetic" starts with an "A" and "math" starts with an "M." The whole thing confused me.

Equations, in particular, were baffling. I couldn't understand them. Years later, I redeemed my near failures with math, but for all of my K–12 years, math was not only my hardest subject but the one I most despised. I was convinced that some wizened, weathered, old man sat hunched over a workbench with a vise, a chisel, and a leather mallet and worked all day to come up with math in order to torture young people. That was his sole purpose in life.

I despised math because of math itself but also because of the peripherals that went along with my numerical failings. I had no recess from 8:30 in the morning to 3:10 in the afternoon for nearly the whole of fourth grade because I hadn't learned my multiplication tables.

My teacher, Mrs. Shutt, gave me what she called a "multiplication wheel," which I was supposed to use to learn 8 x 6, 8 x 7, 8 x 8, and the rest of the times tables. I hated that wheel. Actually the wheel was simply a circle that Mrs. Shutt had drawn and then copied onto a blue ditto sheet, a term from the Dark Ages of education. There were numbers, 1 through 12, and little marks all around the wheel, like a clock. I was supposed to go clockwise around the wheel, tick by tick, and somehow learn my times tables. Day after day, all my friends went outside to recess while I was stuck inside with Mrs. Shutt and blue ditto sheets. Mrs. Shutt was bound and determined to push me through fourth grade one way or another. I'd spent two years in third grade, after failing my first go-round, and for a long time it looked like fourth grade was going to be a double header, too.

In addition to being robbed of recess time, I also was not allowed to participate in other class activities because of my math shortcomings. I especially remember the time that the school had for some reason decided to give gifts or pieces of art to the City of Redlands. I have no idea why. I just remember this "tree" of sorts in the back of our classroom. The students were to take small pieces of pink tissue paper, twist them, and then tie them onto the barren branches with thread. I think the idea was that the tree, which as I recall was really just part of a tree or a bunch of dead branches bound together, was supposed to look like it was blooming.

Since I hadn't learned my multiplication tables, I wasn't allowed to put anything on the tree. I think Mrs. Shutt viewed me as a less than full member of the class. All my classmates huddled together around this tree, twisting pieces of tissue paper and tying them on the tree, while I slaved over the times 8's. I decided it wasn't fair and set a goal to put at least one pink tissue "bloom" on the tree. One day while Mrs. Shutt was out of the room at lunch, I dashed over to the tree and tied a piece of pink tissue paper on the tree. However, consistent with my luck at that school, she came in at just the wrong moment and made me remove the twisted tissue.

Every morning before school I had a terrible stomachache. My mom thought I had an ulcer because I hated school. Her other theory was that my Superman underwear was too tight. Either way, a long way into the school year my parents finally took pity on me and intervened in the no-recess problem, saying I had to have a break and get outside.

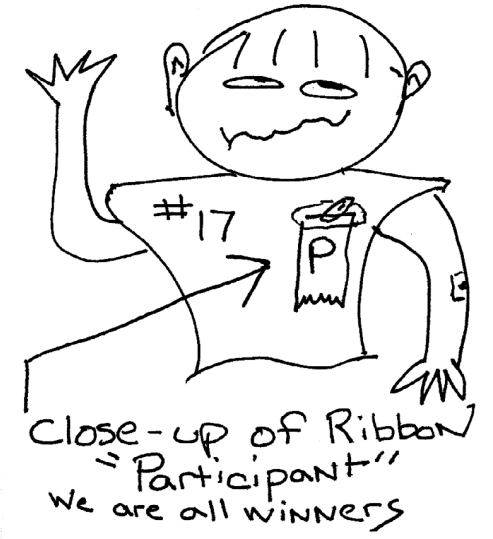
I got back at Mrs. Shutt in the small ways I could as a kid. The first bit of revenge was the plastic snake I'd bought at Knott's Berry Farm. I put it on her desk one day by her books. As I hoped, she reached for her books, saw the snake, and screamed. The whole class laughed.

The second retaliation began, ironically, on the playground. Like every kid in every city across the United States as long as there have been schools, we weren't supposed to swing too high on the swings. Of course, like every kid since time immemorial, we did it anyway. One day several of my friends and I were in a competition to see who could swing the highest and jump off at the greatest height. I swung very high and then jumped off. I turned to walk back behind the swing to get in line to do it again. My friend had climbed onto the swing immediately after I had, swung very high, and jumped off. As he did, the swing hit me, leaving a huge cut in the side of my head. Blood was gushing everywhere.

I went back the classroom to tell Mrs. Shutt, but she was busy talking with some girls who had been in line at her desk. I tried to tell her I needed to see her right away, that I was hurt, but she told me to get back in line and wait my turn. I waited with my hand over the bloody cut. Finally, when I stood at her desk, she said rather sarcastically, "What is it you were in such a hurry to tell me?" I took my hand away from my head, which was still bleeding profusely, and, of course quite by accident, I bled all over her desk.

I did eventually make it through fourth grade. It was more of a mercy pass from Mrs. Shutt, who probably couldn't face another year of being vexed by

my math inadequacies. Although I shudder a bit at the thought, I probably was an elementary school "participant."




These are my most vivid memories about school math.

Shortly thereafter, I had an encounter with math in a completely different setting that led to a decidedly improved relationship between myself and numbers, equations, computations, and the rest of the gang. In one cool moment in the shade of a tree, I thought that perhaps these things that had for so long frustrated me might have some redeeming value after all.

## Skateboarding and the $E = mc^2$ Encounter

During my elementary and middle school years, I spent a good deal of time outside on my skateboard looking for hills to test the effectiveness of different lubricants I was using in my skateboard wheels. My personal favorite, ATF, was the quickest.

Eventually I discovered a big hill by the University of Redlands, which turned out to be one of the few great racing hills near my house. One day, I was racing down one side of the hill, but thought I'd try the other side for a change. When I reached the bottom of the hill, I decided to take a break

from the hot sun. Sitting in the shade at the bottom of the hill outside the university cafeteria was a small, round, low, bronze table or sculpture of some kind that had "$E = mc^2$" carved in the top.

I looked at that equation many, many times as a kid. I didn't understand it at the time, but it stuck with me. It was such a simple equation with, I later learned, tremendous power and application. Unlike the long, mind-numbing equations, diagrams, and graphs that the dashing, eloquent spaceman Klaatu finds on Professor Barnhardt's blackboards in the great movie *The Day the Earth Stood Still*, which I'd seen years earlier, $E = mc^2$ was simple and powerful.

## Operator Rate Per Conductor

Someone once said that all things can be expressed mathematically. While I was working at Tri-Tec Engineering, I came up with a simple, but useful equation—Operator Rate Per Conductor—that was the precursor to one of the most valuable concepts I use in business today.

All of the equipment manufacturers we dealt with at Tri-Tech made claims about how great their equipment was, but their advertised capabilities were expressed in different ways. I was looking for a way to put these capabilities on a par, so I could more accurately compare them.

I used the smallest unit in cable assembly, a wire, more technically referred to as a *conductor*, to create a simple concept: Operator Rate per Conductor, or ORPC. When an employee—an operator—builds a cable assembly, he or she handles each conductor in the assembly. Expressing production in terms of the number of assemblies produced per hour, or number of assemblies produced per hour per operator is useful; however, knowing the ORPC—how quickly an operator can process a conductor—is valuable because a cable assembly might have 1 conductor or 100 conductors. How fast can one operator process one conductor? Said another way, what is the cycle time of one conductor? Using ORPC, every piece of equipment, and