Math and Algebra YOU CAN DO!

By

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If your teachers let you down in school, and now you're out there in the real world all alone, contemplating starting your own business, and wondering how you're going to conquer "Business Math," you've come to the right place to fill in the gaps and take control of both Math and the dreaded misery called "Algebra!"

Okay, I know you thought you'd never see Algebra again after you graduated …. Well, think again!

Math, and especially Algebra, was my nemesis growing up, and, because of that, I've spent an inordinate amount of time and energy both trying to understand why I had so much difficulty with it and in finding the ways and means of the solutions.

I've considered myself "Math Handicapped" most of my life, and I still have problems with Math, but when you find ways to overcome handicaps, you're no longer "handicapped," anymore than an amputee without legs could be considered "handicapped" by a so-called "able-bodied" person sitting in the grandstand watching them brilliantly cross the finish line in the Special Olympics on a pair of titanium legs. "Handicap" usually means you have just not YET found the solution to the problem which challenges you.

I WAS "Math Handicapped" and I overcame it, so I will happily share my solutions with you….

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The following Math lesson I created for ADULTS, NOT children, when I was teaching all subjects to all college students and adult non-students (ages 18 to 80) in the CPI Learning Lab (Center for Personalized Instruction) at our local community college. I have taught the occasional bright child or adolescent since, but this is a lesson designed for adults.

I will also include my handouts as they were originally written and copyrighted in 1991 and you are free to use them for your personal use and to help your children, if you wish, but you are not permitted to copy them and use them on any commercial basis for any commercial reason. They are copyrighted to me, but as I am posting them to the ECN, the management also has a vested interest in the materials and shares my copyright, so you are bound by the same copyright rules as by all other materials offered for your enrichment on this web site.

Now for some background on me and how this lesson came about:

As a teacher in the Allied Health Division of the lab, it was my job to teach anything and everything that any and every student came to learn or to have assistance with pertaining to a subject they were studying in college classes or trying to prepare for those classes or in

preparation for any and all exams which were on all levels of local, state, or national, including, but not limited to, Allied Health licensing exams.

I had been honored by the Chairwoman/Director of the department with an invitation to teach for her and was given the additional honor of choosing what division would be my preference: English, Math, or Allied Health.

I chose Allied Health because it was the catch-all department where all students came for any and all help on any and all levels, with any or all subjects, and for any and all programs offered by the college, by programs in the community, or through any or all partners of the college within the community, including community and state agencies which I tested for hiring and then also remediated if they failed parts of the testing process. So, I tested, remediated, and trained those hoping to be hired into the local four-county school boards, police departments, sheriff departments, fire departments, police and fire academies, and those who were already hired and working for those agencies but in need of additional education.

Considering that I had been a driven high-achiever, and was competent in all my subjects, my request was granted and I began to teach where I could be challenged on all levels all the time and had many students around me for my hours on the job, all of whom I was helping in different subjects and with different projects. My days were both exhausting and exciting and an additional small supplemental income kept my bills paid so that I could continue in this beloved position until the "Savings and Loan Crash" resulted in the losses to our department of the grants which supported each teaching chair and I was laid off along with 97 other adjunct faculty members across the four campuses which spanned our four counties.

Of all the "jobs" I've had in my lengthy career, this was among the ones I loved the most. There were many tears streaming down many faces when the funds dried up and that position came to an end. Whenever economic times are hard, Education and Social Services always get cut...and these are always my fields of endeavor. (Now maybe I've just given you some insight into the vast diversity of my skills.)

You can only be in this kind of work for Love because financial rewards are slim to none, so you have to assess your rewards differently and you had better have a secondary income from some other career or pursuit, which I have always managed to have. I don't recall ever only having "one job." If I have had a "job," I have also had a business at the same time...both a wage earner and an Entrepreneur.

There were two other teachers who I knew there who shared my ideals. They were a married couple and he taught Math and she taught English. They were also both artists and they supplemented their income by taking their art work to the flea markets on the weekends. "Helper Personalities" work for Love, not money. We need money to eat and pay the bills, but we never regard it as a goal or a reward… or even an achievement of any magnitude. Philanthropy is the best "feel good" reward I've ever experienced. I just need "enough" money to pay the bills and put food on the table and I am content, which is how my artist colleagues also felt.

"Philanthropy often means working for wages because those who really need the help cannot be accessed any other way, they can't afford the services, and the wealthy, who could afford to pay, don't need the same kind of help...and you have bills to pay, also."

The second "job" which I loved nearly this much was when I was asked to invent, create, set up, and facilitate a substance abuse program for both the male and female inmates in the two local county jails. I loved that "job" for the same reasons - the huge, deep, and wide diversity of the challenges which were so exciting and rewarding, but certainly NOT economically rewarding.

It is well understood from the Classical times of Ancient Greece - that Educators and Counselors are servants of the people and, as such, are seldom rewarded economically with much more than just a stipend of subsistence living wages. When you "work for Love," that is just part of the job description and you don't get into this kind of work without understanding what all goes with the territory. And it has nothing to do with taking the "easy way out," because these jobs require MORE, not less, formal education and on higher levels than average.

Paying the bills constitutes "enough income," and wearing jeans with holes in the knees and driving an "old" car are the well-accepted "badges of honor."

Now, you have some brief idea of my credentials so you can decide the credibility of what I will try to teach you. The most important lesson which I learned in my college "Critical and Creative Thinking" course was to learn who the person is who is making the statements and then that sets the tone for how well-received the information will be. However, the learning process is like a "game of catch." It takes both a "Good Pitcher" and a "Good Catcher" for the learning process to be a success. So, I will do my best as a Pitcher and you must do your best as a Catcher so we can call this learning process a “success.”

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And now I’ll tell you some more about the learning process before I begin the Math lesson because if you have been traumatized by the Educational System and the Math Teachers, then you need some understanding of what happened and why so you can overcome the damages, get rid of the anxiety, and give yourself permission to see yourself as intelligent and competent—and then open your mind to the knowledge.

Professional Educators and Counselors come to the job with their own skills so there is no "training," per se, and no real materials provided, with the exception of particular protocols for administrative purposes and some required materials for specifically-outlined programs based on partnerships and grants.

Outside of those few exceptions, Educators bring their own ideas, methodologies, and materials to the job along with their experience. As "Professionals," we are expected to know what we are doing and to "hit the ground running" the moment we are shown to the chair and desk where we will be sitting during our work day. You are only hired for the position after a careful scrutiny of your resume and a very in-depth interview to determine if you have the skills and experience to do the job. Then you’re on your own.

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That having been said, when I came to the job, I listened carefully to my students and determined that many of them shared the same handicaps and damages which had been my experience when I was a student and they needed the same kind of help which I had ultimately come to serve to myself after determining what had gone wrong with my early Math education, particularly with Algebra, why it had gone wrong, what painful effects it had all had on me, what I could do to correct all of that mess, and how to finally teach myself what had been lacking all those years.

So, just as I had healed myself and finally taught myself Math and Algebra as a mature adult, I also helped them to heal and learn how to be competent... and confident... in themselves and their abilities to understand and be in control over Math and Algebra, and all learning, instead of the other way around.

As I sat at the Teacher's desk in my department each day, I listened to the heart-wrenching stories and witnessed the tears of self-condemnation as adults told me that their lives had been ruined because they were unable to do Math and Algebra... that they were "too stupid" to understand it... and that they "failed" to accomplish their dreams because it always stood in their way—and they could never get past it.

I had tears in my eyes, too, because that's exactly how I had felt until I tackled that demon and wrestled it to the ground, killed it, scooped it up on the tip of my sword, and carried it dangling to the dumpster to throw it away for good.

In listening and experimenting with some simple testing, I discovered that every student, no matter the age, background, gender, intelligence, or any other variable, got stuck at Fractions and could never really get past them.

They got through school like "parrots" memorizing and regurgitating on tests, but they never understood and they never owned the knowledge. So, I was looking at what I thought might have been a time warp at Second or Third Grade in Elementary School.

That prompted some in-depth thinking as I put myself in that place again, pulled together everything I had learned from my formal education in the subjects of Educational Psychology, Human Development, Experimental Education, Human Perception, and all of my years of personal and professional experience and research in a wide variety of areas such as Test Anxiety, Adult Testing, Effective Learning, Enrichment Counseling, Crisis Counseling, Relationship Negotiation, Career Counseling, Employment Testing and Evaluating, and Personality Theory—and I began to write a course to help my students to overcome the personal damages that I had overcome and to become competent and self-confident in Math and Algebra.

I even used my course experimentally when I was working with adolescents in a local Psychiatric Hospital. I taught them my course not to teach them Math and Algebra, but to teach them self-esteem and self-confidence, and it was practically a "miracle cure" because the positive effects were profound and immediate. So, I knew that I was on the right track and I developed the course which I have taught since that time and taught at the college for the duration of my tenure there, and which I will try to teach you more briefly and using the same handouts that I wrote by hand then and have been using ever since because the casual nature of the hand-written handouts is more personal and less stressful than what might be perceived as "academic materials," and when something is not broken, there is no reason to "fix" it.

What I am about to teach you is "Original Thought," theories which I have developed, and is only known by those who have been my students, so you will not find the materials or the terms I have coined documented anywhere. This is all my theory based on my research and my experience. I have experienced the successful results 100% of the times that I have taught this, so I have faith in my theories and how they translate successfully to reality.

As far as I am concerned, I have tested the hypotheses so many times and each time the results have been the same: Success. So, I believe that if you continue to read and open your mind to the learning process... become the best "Catcher" that you can be, then you will not only learn how to do Math and Algebra competently, but any lack of confidence that the ancient broken process has caused you to suffer will now be under your control and you can turn it to feelings of self-confidence and success.

So, I invite you to keep reading and learning as I write what has been a verbal course taught over the years and I will insert my handouts as graphics as we go along.

We will begin with an explanation of what has caused the problems in the first place, so if you had no problems learning Math and Algebra in school, you may not be able to feel the same pain that someone will who has suffered through the process. But, you certainly can learn to understand them better, empathize, and maybe be a better support system for them while they try to overcome the damages they have suffered and move forward to get beyond the demon which might have stood at the gate to their dreams — and who never let them pass.

Brain Testing

There are two important tests which you need to take before you start your learning process. They will help you to determine your learning styles and what your biological architecture is all about.

We will start with the Brain Test which has nothing at all to do with intellect and everything to do with which parts of your brain are dominant. You brain is “plastic,” so results can change.

The brain is comprised of many parts, but with this test we want to determine which of your main hemispheres is dominant and if you are dominant for Visual or Auditory information input. You have a Right and a Left Hemisphere in the brain.

The Left Hemisphere: Sometimes called the "Left Brain" is responsible for a mathematical kind of logic. People with a clearly Left Hemisphere dominance tend to do better in Math if they have good opportunities to learn. The farther to the Left, the more logical, but the less skill they have in communications and free-form art, and free-form music. Left Brain art and music tend to be more mathematical as in architecture and engineering. Left Brained people tend to excel in hard sciences, computers, programming, engineering, and Math.

The Right Hemisphere: Sometimes called the "Right Brain" is responsible for communications, spatial skills, and free-form art and music. The farther to the Right, the more poetic or artistic a person might be, and they may have philosophical logic if they are highly intuitive, also, but they will generally have problems understanding Math, especially if they have poor teachers. They will generally excel in being able to interpret poetry, which may give the Left Brained person a

very hard to impossible challenge unless they are highly-abstract. Right Brained people tend to excel in social sciences, philosophy, people-skills, effective relationship communication, writing, poetry, free-from art, and free-form music.

Center-Brained: Rarely, a person has no preference, or one that is so slight that it is still considered equally-balanced between Left and Right. Being Center-Brained, brings with it many benefits, but also some interesting challenges. With a Center Brain a person can pretty much do all of the things which are normally attributed to Left and to Right Hemisphere dominance. Of course, there are degrees of competence and it also is driven by many other factors like intelligence, desire, education, opportunity… They can later develop either side to dominance.

Because I was Center-Brained, the Director of Education at the local hospital had interviewed me for a position that she did not hire me for, but she recognized that I could cross over the hemispheres with my skills and she had the Board create a position for me as a Liaison between the IT (Information Technology) department and the administrative and medical staff because the IT people simply could not ever communicate with the administrative staff, or nurses, or doctors and there was a huge problem in setting up systems, training, and troubleshooting. So, I was hired and placed between them, and I did all of the training and troubleshooting and was the go-between so that whatever needed to be done finally did get done.

It was a wonderful position until the upper management of this national hospital chain embezzled so much money and defrauded Medicare so much that they had to lay off gigantic numbers of employees, mostly high-salaried upper and middle management people who had been there for many years, and shut down entire departments to try to recoup the stolen funds to keep the doors open and prevent bankruptcy. The Education Department was deemed unnecessary and the director of my department, who had been there twenty-six years, and all of the employees were let go as they closed entire departments... and bye-bye to me, too.

I actually made a decent living on that job, probably because it was private industry, for-profit, but they stole all the profits from tax payers, just like they do in too many “non-profits,” where they just consume it all so there is never any taxable "profit" to declare at the end of the year. (Yes, this is a sore spot with me. GRRRR!)

Visual or Auditory: We generally have a preference for more effective learning through what we see or what we hear. It is very valuable for us to know which dominance we have. And it is something that I want to be able to report to parents who are trying to do the best job of dealing with their children. If the child, or adult, has a preference for Visual, then don't tell them things; write it down. If they prefer Auditory, then tell them and then write it down for reinforcement. The same goes for adult relationships. These are very valuable tools for good and effective communication.

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Test Time Now!

Now, I am going to request that you take the test. I have uploaded it to my web site and I will give you a link to its location. You will click the link below and when you see the directory on the web site, there will be a file called "BRAIN.EXE." Right-click your mouse arrow on the file and you will get a menu. From the menu left-click either "Save Target as" or "Download," whichever option you have in your browser. Then you will have a dialog box which will ask you where you wish to download the file.

If you are very computer savvy, download it anywhere where you can find it again. If you are not, then I would suggest you download it to the Desktop where you can easily find it.

Here is the link: **http://www.coachjudi.com/public/index.html**

After you have downloaded the file here is what you do next:

1. Find the file on your desktop or wherever you have stored it.

2. Make sure that your printer is on and that you have it set to print.

3. If you have a screen print program, set it to work with key strokes because the Brain Test will take your entire screen and you will not be able to reduce it to get to any other programs or even to your desktop. I have not even been able to get Alt+TAB to run when the Brain Test has filled up the entire screen, so be prepared for any keystrokes you need before you start the program.

4. Have paper and pen ready in case you need to sketch your brain schematic if you do not have a screen print program.

5. Double-click program icon on your desktop with your Left mouse button and it will open and start the program.

6. Use your Enter key to get to the place where you will be asked to type your name. Do type your name because it will enter into the final analysis which you will be printing out later on.

7. Follow the instructions on the screen and don't spend too much time selecting your answers. There are no "right or wrong" answers. Your answers are only going to point out your dominances.

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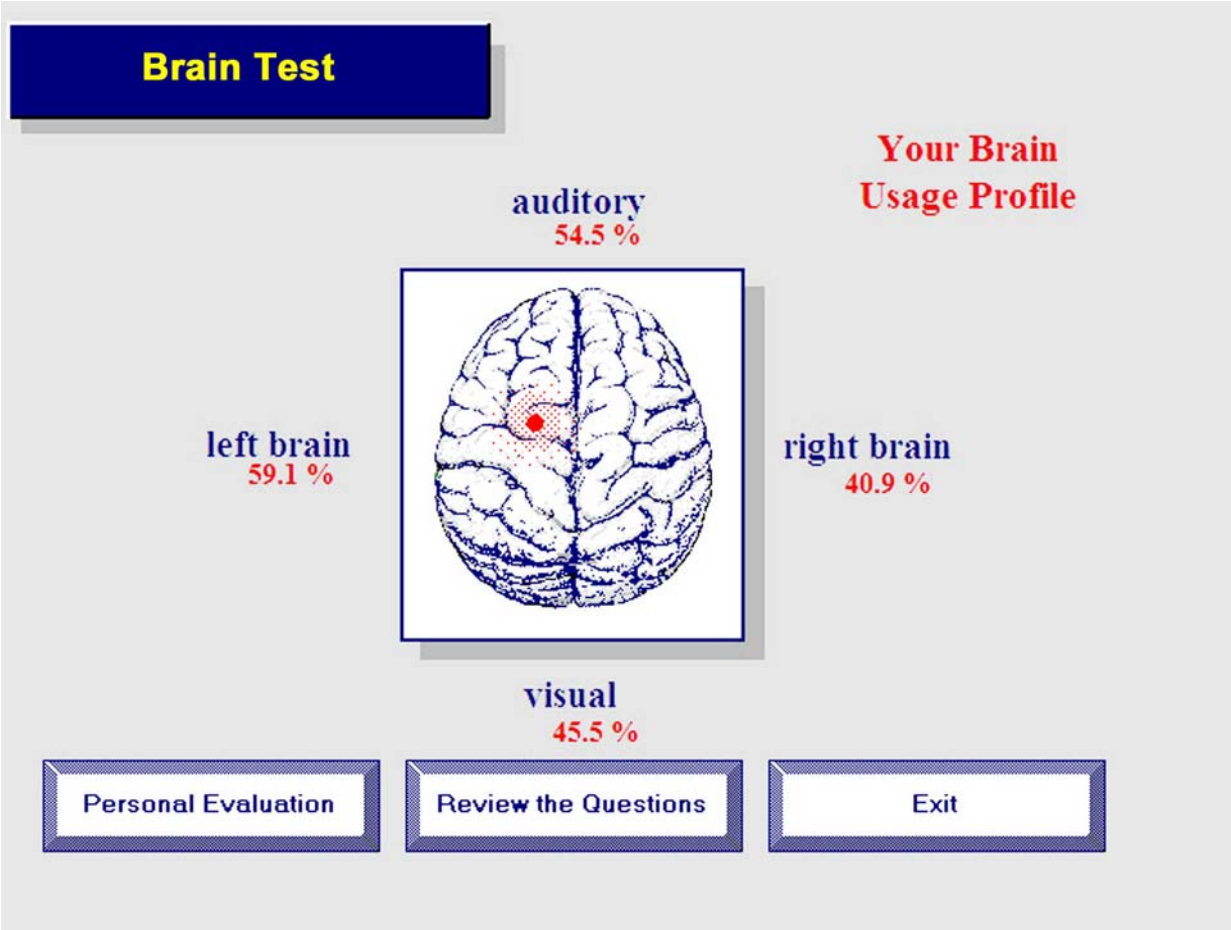
When you have completed the test, you will have a picture of your brain architecture like this sample one below:



After you have studied your brain architecture for a while, either do your screen print, if you can, or make a sketch indicating the percentages of each element so you can keep them.

Hopefully, you have your printer set to print at this point because you are going to click the "Personal Evaluation" button and you will see a sliding scale of your elements and then below that will be the first page of your results.

Click the "Print" button and make certain that it has printed before you go to the next page. This is a DOS based program, so it does not work the same way a Window's program works and if you lose the screen, you may not be able to back up, so take it slowly and carefully. Once you have been able to print the first page, then select the "Next" button and click it to get to the second and final page.

Print the second page and make certain it has printed before you use the "Exit" button to leave the program. If you failed to get the prints that you want, you will not be able to duplicate your answers by doing the test again. It will give you different questions the next time.

After you have finished testing yourself, I'm sure you will have a ball testing your family, friends, neighbors, and maybe even the family dog. Have fun with it. It's very powerful but learning about yourself is a great deal of fun. And knowing the dominance of the elements in your brain will be vital to the lesson which I will be teaching you next.

There will be another test, much more simple than this, but I have to figure out how to write it for you so that I can do the best job of helping you to have an authentic outcome since normally I have to administer this test individually to make sure that the results are authentic. We will just have to do the best we can, but you can play with the Brain Test while I'm devising a simple version of the next test I need to give you.

Have fun!

The Brain Test is a fundamental tool which I use to help those who have suffered anxieties about Math and Algebra through trauma from a dysfunctional educational system, resulting in loss of self-esteem, self-confidence, and the development of self-fulfilling prophesies of failure.

The learning process is still a "game of catch" but if you are a great "catcher" and you have a lousy "pitcher" who can't pitch to you, then you won't catch no matter how good you are.

The Brain Test shows the raw brain architecture, but it does not take into account all of the other variables, including opportunity. The educational system in this country has probably ruined as many students as it has helped and it needs to be deconstructed and built all over again, but no one has an awareness of the problems or any ideas about how to fix them… and there's just one of me.... So, I can only do what I can.

Like Beauty, "Smart is as smart does." But when the system that is supposed to make the most out of Smart, all but destroys it, then someone has to step up to the plate and try to help... This has been my battle for a long time.

As I said before, the Brain Test is only one component of the issue with learning Math/Algebra. I will show you what to expect on your Brain Test and how the Profile Evaluation is developed by contributing a sample test result based on a client's brain architecture. But, again, this only shows how the brain architecture is set to operate, and does not account for all the other variables. However, when I am evaluating a person's learning styles, knowing their dominances is extremely helpful, but does not tell the entire picture.

Another important factor is that the human brain is "plastic," meaning that through your experiences and learning processes, you can change the structure of your brain and even change the hemisphere dominance if you actively pursue activities which will develop one hemisphere beyond where it is when you are tested. Then testing yourself again will reflect the changes. This is what therapists do after strokes and other brain injuries.

Below is the evaluation based on the previous graphic. If you would like to post your evaluations in the ECN Forum, it could make for some interesting discussion. Please feel free to do so.

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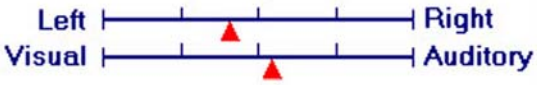
Brain Test
Personal Evaluation



XXXXX you are somewhat left-hemisphere dominant with a balanced preference for auditory and visual inputs. Because of your "centrist" tendencies, the distinctions between various types of brain usage are somewhat blurred.

Your tendency to be organized and logical and attend to details is reasonably well-established which should afford you success regardless of your chosen field of endeavor, unless it requires total spontaneity and ability to improvise, your weaker traits. However, you are far from rigid or overcontrolled. You possess a degree of individuality, perceptiveness, and trust in your intuition to function at much more sophisticated levels than most.

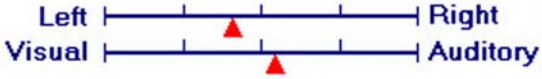
Having given sufficient attention to detail, you can readily perceive the larger aspects and implications of a situation or of learning. You are functional and practical, but can blend abstraction and theory into your framework readily.

Next

Print

Exit

Brain Test
Personal Evaluation



The equivalence of your auditory and visual learning orientation gives you two equally effective sensory input systems, each with distinctive features. You can process both unidimensionally and multidimensionally with equal facility. When needed, you sequence material while at other times you "intake it all" and store it for processing later.

Your natural ability to use your senses is also synthesized in your way of learning. You can be reflective in your approach, absorbing material in a non-aggressive manner, and at other times voracious in seeking out stimulation and experience.

Overall you tend to be somewhat more critical of yourself than is necessary and avoid enjoying life too much because of a sense of duty. You feel somewhat constrained and tend to sometimes restrict your expressiveness. In any given situation, you will opt for the rational, and learning of almost any type should be easy for you. You might need certain ideas explained to you in order to fit them into your scheme of things, but you're at least open to that!

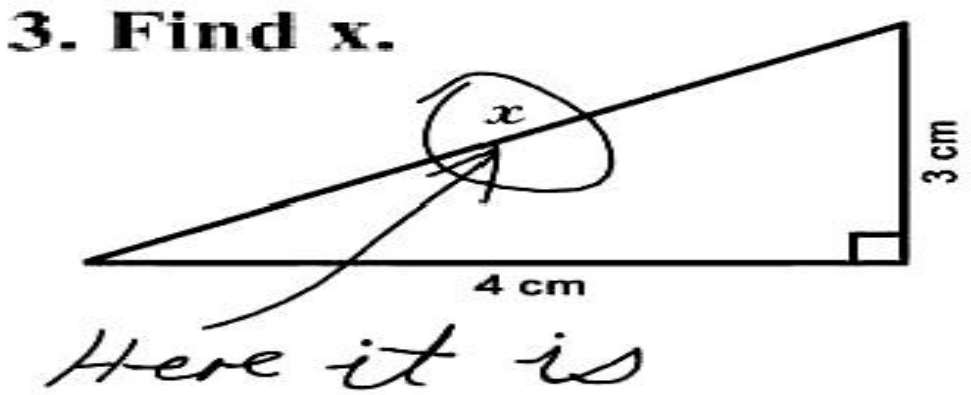
Back

Print

Exit

As a Professional Educator very skilled in using these tools, I would look at a result like this and determine that the person has enough Left Hemisphere "Mathematical Logic" at their disposal, so if they are sufficiently intelligent and have appropriate **opportunity** to learn Math/Algebra, and they're having problems, then I would delve deeper into the issue and I would look at the results of the next test that I plan to offer because it will determine the biological brain developmental capacity or limitations. This, then, completes the biological picture for me.

If all results still indicate that the person should not be limited by biology, then I will look at environment, but first we need to examine the nature of the biological determinants. If the solution were so simple to find, then it would not require professional skills and everyone would be running around enthusiastically "finding X," as in the joke graphic below, which is not at all funny to someone who has been wounded by that very same "X." It's not funny when it hurts.



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Here is the Second Test

Normally, I give this test in a much larger and more complex format and I watch carefully to make sure that the person is giving me authentic answers because the objective is to select which of two attitudes describes how you see yourself...or your "Preferences." You are NOT to select the options which describe how you wish you were or how you have been told you are supposed to be, but how you really prefer things and what is natural for you whether you think it is the best way to be or not and whether you think someone else might not agree or approve. I have tested children with a parent standing by and was not able to get the authentic answer from the child because they gave me the answer that they knew the parent wanted to hear and not what they actually preferred or how they really saw themselves naturally.

So, I need for you to look at each set of possibilities and then select the one which feels most comfortable to you and describes who you naturally are, NOT who you are supposed to be or want to be or have been told you should be... but select who you really are and then mark either a "C" or an "A" answer for each set of possibilities.

There are 11 sets of Preferences, so you will have more of one attitude "C" or "A" when you are finished.

Now count how many of each you have selected and write down if you have more "C" answers or more "A" answers.

Next I will give you the interpretation and then we will begin the lesson armed with your knowledge of your brain architecture and the other biological elements which will affect how you operate regardless of the environment.

I will then use these benchmarks to describe how the important elements in the environment operate and you will be able to come to terms with the reality of what caused you so much difficulty in school, in general, and in Math and Algebra, in particular.

Now read the two options under each listed quality and put a check mark by the one which you prefer and feel comfortable about as a description of you.

1. (C) Are you a Facts and Details person? or
   (A) Are you more of an Ideas and Big Picture person?

2. (C) Do you admire Practical Solutions? or
   (A) Do you admire Creative Ideas?

3. (C) Do you need to See and Touch something to understand how it works? or
   (A) Are you interested in Theories that only exist in the mind?

4. (C) Are you focused on your Environment and what you can Perceive with your Five Senses? or
   (A) Do you like to stare out the window and lose yourself in your Imagination?

5. (C) When you walk into a room, so you notice the Facts and Details? or
   (A) Is your attention drawn so anything New and Different?

6. (C) Do you pride yourself in seeing the Practical Reality around you? or
   (A) Do you pride yourself in your Creative Imagination to see what Could Be?

7. (C) Do you live grounded in the Here and Now? or
   (A) Do have your head and your thoughts in Plans for the Future?

8. (C) Do you only Trust your Actual Experience? or
   (A) Do you place great Trust in your Gut Instincts?

9. (C) Do you prefer to read step-by-step instructions and use Established Skills? or
   (A) Do you prefer to figure things out for yourself and learn New Skills?

10. (C) Do you normally work at a Steady Pace until you are finished? or
    (A) Do you tend to work in Bursts of Energy as you feel the inspiration?

11. (C) Are you more comfortable following the accepted Rules of your Peer Group? or
    (A) Do you see yourself as someone who Marches to the Beat of your own Drum?

Enjoy! Next we will resume this lesson....

Even a genius hidden away in a patent office had some thoughts on this subject:

"Do not worry about your difficulties in Mathematics. I can assure you mine are still greater."
~ Albert Einstein

In case you'd like to play around a little with Left Brain, Right Brain, Center Brain stuff, I did some research and found an interesting web site with some interesting information which could be fun to play with for a while.

Enjoy!

http://www.funderstanding.com/content/right-brain-vs-left-brain

NB: Brain architecture is only part of the picture, NOT All of it! What I always find scary is when Social Scientists make some kind of discovery and then stop thinking at this point and make that discovery their "claim to fame" and don't keep digging away for more. To me a discovery is like pulling the very tip of a thread on the piece of cloth; now I have to keep picking and pulling at it until I can get it to completely unravel.

I don't understand how anyone can call themselves a "Scientist" or "Researcher" if they can stop their thinking at any point. Thinking and digging.. and digging and thinking must continue for the Scientist, the Researcher, the Philosopher, the Poet, or the Curious, which means anyone who is a Thinker and a Doer....

And so we keep on going... but we can stop here for a lemonade for a while. Enjoy!

Now that you have taken the last test, you have determined if you are a "Concrete Thinker" or an "Abstract Thinker."

Concrete Thinkers experience the world based on their Five Senses: Seeing, Hearing, Smelling, Tasting, and Feeling.

Abstract Thinkers experience the world based on the five senses and beyond that into the Theoretical World of Theory and Imagination on Intangible planes.

According to such Social Scientists as Jean Piaget, only 35% of human beings develop beyond the Concrete Thinking stages and into Abstract Thinking at somewhere around the age of 16 years.

In my studies related to Personality Theory, which indicates that about 25% of all human beings fall into the iNtuitive Personality Types while 75% fall into the Sensor Personality Types, I relate Piaget's Abstract thinking as the 25% of iNtuitives, who are also Abstract Thinkers who function beyond the boundaries of the five senses and mostly dwell in the intangible world of Theoretical Models.

In my studies and my professional experience, and research, I have proven to myself and others that roughly 25% of the global population are Abstract Thinkers, or iNtuitives, while 75% are Concrete Thinkers, or Sensors. As in all cases, the majority rules, so the structured world around us has been built by the majority for the majority, which means that our institutions are built by Concrete Thinkers for Concrete Thinkers. This also means that the minority, the 25% who are Abstract Thinkers, or iNtuitives, have to struggle to survive and flourish within those institutions, many of which have to do with both Education and Finance, which also means Employment and/or Business.

Abstract Thinkers (iNtuitives) invent the world.

Concrete Thinkers (Sensors) build the world which has been invented by the Abstract Thinkers.

Then there is a transitional type which can live equally in the worlds of both and can Invent, Translate, and Build. They are generally Center Brained and they are the rarest of all Personality Types, at 1.4% globally.

There is no type which is more important or less important. Each one is vital if we are to have a world to live and function within. So, whether you are Abstract or Concrete, you play a vital part in how the world functions. But, understanding which you are will help you maximize your opportunities for Happiness and Success. This is what I plan to address in this lesson. I hope this will help you in many ways. This is my objective.

This category of Thinking and Personality qualities is one half of the equation; the other half has to do with Brain Hemisphere dominance. And, all of this has to do with Brain Biology and cannot be changed. But, with knowledge, you can maximize your qualities to make them work greatly to your advantage.

If you happen to be Left Brained and Abstract, Math and Algebra CAN be simple.

If you happen to be Center Brained and Abstract, Math and Algebra CAN be simple.

If you are Right Brained and Abstract, Math and Algebra Can be simple.

If you are Left Brained and Concrete Arithmetic CAN be simple.

Actually, to be honest, whatever your brain architecture, Arithmetic, Math, and Algebra CAN be doable or simple IF you have a teacher who can teach it. Aye, there is the rub!

But, no matter your brain architecture, if you have teachers who never understood Math or Algebra as students themselves, but are required to teach it to you as part of the required program in the elementary grades and benchmarks developed for your grade level (and they are only told to teach it, told what the achieved skills are supposed to be and how they are supposed to test, what texts are to be used for the class, but NOT "How to teach it,"), then you may find yourself stuck in your attempts to acquire the very foundation that you need upon which to build your Math and Algebra body of knowledge because your teacher spends time creatively presenting her/his favorite subjects like Social Studies or Reading and just fluffs past Arithmetic superficially and with no ready answers when you are confused and s/he has no answers to guide you to some understanding.

So, the net effect is that the teacher is NOT building a foundation for Math, but IS building a foundation in you for feelings of failure and self-doubt which are so powerful that they can and will most likely last a lifetime.

Anyone reading this who found Math and Algebra to be simple will pooh pooh this, but they were not victims of this disgraceful system and their accomplishments, and possible arrogance in light of their recognition that they have apparently accomplished something that others either could not or have not, were only half brain architecture and half good fortune in having the rare good teacher who was a good Math student and is not overwhelmed and unable to teach Math and Algebra.

Any half-way intelligent student who has any kind of brain architecture can learn Math up to a point from a capable teacher. The concrete thinker may balk at continuing to advanced Math beyond, simple Algebraic equations, and the abstract thinker may welcome the stimulation of the abstract challenges in problem-solving which are involved in advanced Algebra and higher forms of Math.

Per my analogy, the learning process truly is like a Game of Catch; it still takes a good "Pitcher" and a good "Catcher" to make it work successfully. You might be the best "Catcher" in the world, but if the "Pitcher" who owns the power of Math and Algebra lessons and tests stinks at Pitching, you are going to only get "pitched" to you that you are "stupid" and that you are incapable of learning... in other words, that you are a "failure," and at the tender age of maybe 7 years of age when you should be building feelings and strategies for self-confidence and success to take you through the rest of your life.

So, when it comes to the academic institutions run by mostly Right Brained Concrete Thinkers (at least 75% of the global population), no matter your brain architecture, when it comes to Math and Algebra, you may have been doomed before your mother even enrolled you in Kindergarten. Pitched by a competent teacher, Math and Algebra are really very simple. When I begin to "pitch" it, you will be shocked at how simple it really is... shocked like every single adult who I have taught in the last 22 years that I have been teaching this subject successfully.

The pain all started with Fractions.

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Academic Teaching Background

I have been a teacher on many levels and for many subjects from Kindergarten to College and Adult. I have taught the "learning disabled," the "emotionally handicapped," and I have taught the "gifted," both children and adults. And I have also trained teachers and trained instructional aids to partner with me in teaching across a broad range of subjects and students. I have set up and run both training and testing programs on the college level. And I have done private training and coaching for many years in my private practice.

I have taught or tutored nearly any subject you can think of that is taught in college in a learning lab environment where the students came for help because they were in trouble in class. Sometimes I have taught what even I did not know, by slipping away and reading the material from the text and then coming back to teach it to the student because the text was not written in a way that they could understand. The first time I had to teach "Boyle's Law," I had to excuse myself to the restroom and slipped away with the text to teach myself first. And teaching how to create a Parabola from an equation proved easier for me after I solved it in my sleep, but I did teach it successfully.

I have been a certified substitute teacher on all levels, and I have been responsible for setting up special educational programs in both academic settings and in non-academic settings.

I have also had several undergraduate and graduate level courses in Education and curriculum design, and I have set up both Adult and Children's ESL and ESOL programs (English for Speakers of Other Languages).

I sat for the state Teacher's Exam and the Special Teaching Exam in Psychology back to back on the same day with no preparation and no study as I learned of them only two days before the exams and came to the tests completely cold and unprepared, yet passed them both.

I have been hired as a professional tutor by private agencies and I have been sent into both private homes and hospitals to teach adolescents under contract to the School Board sponsored Hospital Homebound program.

Based on my very extensive background, I think it is fair to say that my experience, insight, and opinions carry some weight related to Education and the Academic Institutions which are supposed to be educating both children and adults. For the most part, my experience as both a student and a professional Educator leaves me feeling very discouraged about the public Educational System in our country and I also see that the "educational system" as an organized body is clueless in both identifying and solving the problems... yet, the problems continue and the resultant damages have put us in a very embarrassing light compared to public educational systems in other countries.

From all of my experience, I have formed enough opinions to have developed some theories, set up some hypotheses, tested them, found them supported, and used those theories to develop programs, courses, and methodologies to help students of all ages who were or had been struggling with not only Math and Algebra, but with issues of self-esteem and self-confidence.

In developing my theories and putting them to successful practical use, I have discovered some constants that seem to be the roots of the problems. This is what I will discuss next. This will be based on my own ideas, research, and theories put into practice, so you will not be able to read this information elsewhere (unless by pure coincidence) or find any statistics to support it, so you are free to use it or not... embrace it or reject it. It's free, so do as you like and place whatever value on my material which you feel is commensurate with its worth to you.

The copyrights still belong to me, but I am awarding the ECN management the rights of use as they see fit, or not. My purpose is to help those who need the help and to make it a gift to them. This is what a Philanthropist does. Take what you need and pass what you learn to others who also have the needs. In life wherever possible we should always seek opportunities to pay forward.

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Some Generalities Which I Have Observed:

1. The majority of elementary school teachers are Right Brained, Visual, Concrete Thinking young females. (Keep in mind that these are generalities but I believe that if it were possible to generate stats by testing a random population of elementary school teachers across the country, this is what I believe we would find.)

2. The majority of elementary school teachers are interested in teaching because they have an emotional interest in young children, see themselves interacting with them, and have good communications skills (a Right Brain function).

3. Teachers on the elementary school level function well within the standardized guidelines which set benchmarks for each grade level and are able to use those guidelines and benchmarks comfortably to develop their daily/weekly/monthly planners. This is a Visual and Concrete function which will cause stress for an Abstract Thinker because of the feelings of lack of freedom to be creative. Concrete Thinking prefers the secure guidelines to organize them and ideas provided for micro-level creativity within the guidelines where an Abstract Thinker would feel stifled and impatient with the micro-management.

4. As in the global population, approximately 75% of teachers are Concrete while about 25% are Abstract, and the Abstract Thinking educators tend to be on the High School or College levels, where they have more freedom to plan their lessons around looser guidelines and benchmarks.

College educators fall more into the Abstract Thinking category as they have more generalized guidelines and specific benchmarks, so when planning classes and lessons for college classes, the curriculum must meet benchmarks, but the teacher can create the curriculum and submit it with a syllabus to the department head for approval and as long as the test scores fall along the Bell Curve, and students do not complain to the administration, the college teacher has the freedom to create classes based on their personal ideas and methodologies.

As a Center Brained, Abstract Thinker, my tolerance for the micro-management of lower-level teaching, or any kind of micro-management, is low to non-existent as it makes me feel imprisoned, unrecognized and unappreciated, stupefied, and strangled to the point of severe stress and anxiety.

When I set up the ESOL program for K-6th, I was the only one in the entire school district who had any idea at all about how to set up and operate such a program - and I was inventing as I went along because there were no guidelines at all - however, my school principal had to review my weekly planner every week and sign off on it. It was moronic but that's how the elementary system operates.

On the college level, I had to devise a curriculum, set up reliable tests to measure before and after to demonstrate progress, and I had to set up lessons to meet the objectives which I stated in my proposal and write a syllabus and submit it with the tests I had developed to demonstrate that they would authentically test, be reliable, and that the results would be reproducible before my course would be approved.

It was a lot more work, but once it was approved, I was free to run my classes the way I thought they worked best for the students and the school and test scores falling within the Normative Curve [Bell Curve] would be the proof in the pudding that the course was authentic.

So, a Concrete Thinker is comfortable in the very tangible, structured curriculum of the lower grades, but, as the grade levels increase, the teachers and students both progress toward the Abstract and by college level, administrators, teachers, and students pretty much live in the world of Abstract Thinking.)

5. Educators on the High School and College levels tend to be more Male, Objective, Left or Center Brained, Visual, Abstract.

6. Of Educators on the higher levels, females tend to teach more in the Right to Center Brained Social Science areas whereas males tend to teach more in the Left to Center Brained Math and Science areas.

7. Of the Educators on the higher levels, females tend to be Right to Center Brained, Visual, Abstract and males tend to be Left to Center Brained, Visual, Abstract.

8. Both female and male Educators who are Center Brained, Auditory, Abstract tend to span both Educator and Counselor professions.

9. Students in elementary school follow the global brain architecture of 75% Concrete Thinkers and 25% Abstract Thinkers. (I have reasons to doubt whether Piaget was correct about brain development advancing from Concrete to Abstract slowly starting at about age 7 as children begin to realize that a tall, narrow glass can hold the same volume of liquid as a short, wide glass [this is called "Conservation" in terms of Human Development theories] to full Abstract reasoning ability somewhere around age 16 in 35% of the global population.

As no one approaches these issues from the same perspective that I use, there is no research to even question this, so I can only speculate based on my own studies over the last 22 years. I had blamed Algebra being introduced too early to children well below the age of 16 for the problems in their learning Algebra, but I have met too many people who said they could do Algebra just fine at earlier ages all the way down to maybe 10 or 11 years of age, so I question more the teaching than the ability to learn and I also question Piaget's theories in the same way that I have disproved the theory that Personality Theorists, who state that personality is formed in young adulthood, when I have clearly proven to myself that this is incorrect and that we are born with our personalities.

This means that those who fall within the 25% of iNtuitives/Abstract Thinkers are born that way biologically and it does NOT take until they are around age 16 to develop. So, I have to take exception with current theory in Education, Human Development, and Personality Theory. My research bears out that those whose brains have architecture for Abstract Thinking are born with that mechanism in place and that as the brain matures and has experiences, the thinking becomes more acute and the outside stimuli need to be matched with the experiential levels of the thinker/student.

10. I have identified a group of students on all levels of education who I call "Intuitive Learners," and they fall within the 25% of Abstract Thinkers. Because they have a very different set of needs within the learning process, very different from the learning needs for Concrete Thinkers, and the public education institutions are designed and operated by the majority for the majority, they are set up to operate with Concrete administrators and teachers for the 75% of the student population who are Concrete Thinkers.

No, of course no one realizes this. This is my discovery, so it is not possible to discuss this with anyone. I teach this to my private students, only. There would be no way to make a Concrete educational system run by Concrete administrations and teachers understand something that is outside of the five senses. And if that were possible, they would still argue that it would be cost prohibitive to set up a system just for a 25% minority population and staff it with a 25% minority of administrators and teachers.

Students who are what I call "Intuitive Learners" have a very hard time in school and the system realizes they are somehow "different," but they are not able to identify how or why or determine what to do about it, so they label them either “Learning Disabled” or “Gifted” and stick them in special programs which also do not answer their needs, so they fall between the cracks and the emotional and psychological damages begin to accrue at a very early age. Montessori International is the only system outside of really good home schooling which might answer to the needs of "Intuitive Learners," but they are few, far between, and expensive.

Next, I will pull this all together and spend some more time on defining the needs, challenges, learning styles, teaching methods which should be employed for "Intuitive Learners," which I hope will give you some insight into your educational experiences or perhaps those of your children or loved ones.

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Concrete vs. "Intuitive Learners"

Let me use a simple example to illustrate how concrete information is presented to the class by a Concrete Thinker teacher:

The teacher holds a pen up and says, "Class, this is a pen and we use it to write with."
The Concrete Thinker student Sees the pen, Hears what the teacher has said, may Feel the pen if the teacher passes it around the room. Most likely they will not Smell it or Taste it, but they already know that this lesson will be on a test and they have seen and heard and probably felt the pen so they can answer questions about it on the test.

Now the teacher begins to hold up another object to teach the class about it but little Alex, the Abstract Thinker, is an "Intuitive Learner" and he needs to know much more about this pen so he raises his hand to ask a question, "Can I draw with the pen, also?"

Teacher: "Yes, Alex, you can. Now class, this is a clock..... "

But Alex has his hand up again: "Can I write or draw in colors with a pen?"

Teacher: "Yes, Alex... Okay, now let's move on. Class this is a clock....."

Alex has his hand up again: "Could I write different languages with a pen?"

Teacher: "Yes, Alex. Now you must stop asking questions because I need to move on. Okay, class this is a clock...."

But Alex still has questions: "But, Teacher, I want to know if I can write a poem with the pen..."

Teacher: "That's enough, Alex. That won't be on the test and you are interrupting my class, so you need to be quiet and let me move on with the lesson."

Now the teacher has an annoyed to angry look on her face and the other students have begun to whisper to one another behind their hands and they are snickering and rolling their eyes at Alex.

Alex feels humiliated and he can't understand why he can't ask the rest of the questions he has. Isn't he here to learn about things like this pen? Why is the teacher angry with him for wanting to know more about the pen? Why are the children now laughing at him and why does he suddenly feel stupid? Why does Alex feel like he has been "bad" but can't figure out what he did wrong? He is both stupid and bad? How did that happen? What did he do wrong? He thought he was a good boy... and a smart boy? What happened?

So, Alex stops asking questions and during recess, the other children make fun of him and call him "stupid" and all kinds of other names. They look him over and realize that he has some other traits which they can also pick on so they include that in the name-calling to hurt his feelings. He begins to cry and that makes the children laugh even more and they begin to taunt him and that taunting continues for the rest of the school year even though Alex decided right away that he would never again ask a question and that he is somehow "different" from the other children and probably he is "stupid" because they didn't seem to need to know; they seemed to totally understand so why did he have to ask more questions? He wasn't going to ask his parents when he got home either because he didn't want them to think he was stupid, too.

As time went by, he fell under the temptation to ask questions again about another lesson and hated himself for being weak and the teacher got angry right away this time and the children got meaner. Alex was on his way to developing low self-esteem and thoughts that he was stupid and a failure... that he was "different" in some bad way... and he was afraid to ever ask a question again so he just withdrew into himself and stayed there for the rest of the school year and the would-be friendly little boy became a "loner" and his withdrawal and feelings of incompetence pretty much lasted for the rest of his youth and on into his adult years as he battled feelings of self-doubt and the complications which come with it. He also felt very angry, but he suppressed it for long enough that he finally repressed it and his repressed anger came out in some very bad ways as he got older.

Before information can be stored in long-term memory as Knowledge, the "Intuitive Learner," needs to build a "Model" of it so it needs to be understood comprehensively, the model being completed, and then it can be stored in long-term memory and then can be retrieved at will in the future to be used when needed, including during exams in school.

It has been my experience that Concrete Thinkers only store in intermediate memory what they need to regurgitate on a test and then they forget it. If they need to really remember something permanently, as related to their jobs or careers, they push it into long-term memory on a more superficial basis and usually only a sufficient amount that they can gather the rest of the information by opening reference materials. For instance, an auto mechanic or a computer IT worker will remember enough so they can recall what they need to look up in the manuals in order to do their jobs.

The "Intuitive Learner" Abstract Thinker would have built the entire model comprehensively and would use the entire model or parts of it as "tools" to reason ways around solving problems without going to reference materials and only go to reference materials in a pinch if they just don't know where to start on something they have never dealt with before or so long ago that memory has been pretty well extinguished. This is why Abstract Thinkers like to figure things out for themselves instead of doing things step-by-step or by some standardized methods which they have been taught in the past. Abstract Thinkers seldom "read the instructions." They are usually too impatient to get started to stop and ready anyway. And, they are confident that they will figure it easily as they go along because it will be logical and obvious to them.

In order for the "Intuitive Learner" to build the necessary models to completion, they need to have the freedom to gather ALL of the information they need and usually when they ask one question, the answer to that question will lead to a new thought which will produce another question and they will continue that question asking, or research, until they have answered all the questions and have a complete model to push into long-term memory.

Public education institutions are not set up to deliver this much information on a "demand feed" basis to Abstract Thinkers on any levels, but on the college level, it is expected that students will have such continuing questions and that they will have learned how to research on their own to gather that information, but not necessarily taking up so much class time in the process.

In the lower grades, there is no awareness on the part of the institution or the teacher that this process is even necessary for any students and when a student does begin to ask questions in class and slow down the pace of the material which the teacher must present to the class in a given amount of time to cover all required materials in that lesson or in that grade level, the teacher identifies the child as "Special Needs" and makes an attempt to relieve herself/himself of the student taking too much class time by requesting testing to see if this student can be removed from her class and put into a "Special Needs" class for either "Slow Learners, Learning Disabled, or Gifted."

Since none of these categories can either identify or satisfy the needs of "Intuitive Learners," all that is accomplished is that the student is then "Labeled" for life, which causes them to feel "different" at a time in life when the only thing that is really important to the development of normal self-esteem is approval and acceptance by the peer group. Children measure themselves by their peer group to judge how "normal" they are and to see if they need to make any adjustments and what those adjustments need to be. When an "Intuitive Learner" is singled out as "different" in front of the peer group, there is untold damage which takes place to their normal development.

So, if the student is labeled as "ESE," "Slow Learner," "Learning Disabled," "Mentally or Emotionally Disabled," the negative impact can cause great damage to the developing human being. If the student is labeled "Gifted," they have to jump through hoops to constantly meet very high standards and they can develop anxieties and defense mechanisms which are confusing to a child whose greatest needs to be accepted by his/her peers are now very frustrated and some very negative behavior can come of this.

None of these special programs address the needs of the "Intuitive Learner," but they soon learn to pretty much just shut up and go with the flow on the outside and they suffer a great deal of identity crisis on the inside and tend to display behaviors which are not really representative of who they really are.

Normal, healthy mental, emotional, and psychological development can become stilted by the confusion of mixed signals from teacher, parents, classmates, and then social peers and the "Intuitive Learner" begins to find that the world is a harsh place for someone who is "different" and he/she will spend the rest of their life trying to figure out and then understand just what "different" really means and then come to terms with it. Sometimes they have not been able to figure it out until quite late in life when most, if not all, of their opportunities to fulfill their potential have already been lost.

My understanding of this "Intuitive Learner" is not shared by anyone or any members of any educational system, either public or private, but I think that Maria Montessori may have been aware of this type of student, whether or not she knew the root causes or not, but she did set up an educational attitude and system for addressing the needs of such students and her methods were continued by her son, Mario.

The American Montessori system is not as good as Montessori International, but it is still the only system that I know of that customizes the learning process based on the "demand feed" needs of the students. Montessori International does not have structured grades while the American Montessori method has developed formal grades so that students can transfer into traditional grades in public schools or so that they can meet American accrediting agency standards so students will have the credits to be accepted into colleges. So, some, but not all, of the benefits of Maria Montessori's methods are lost in the American format... however, it is still better than the traditional classroom. Home schooling if the parent does the exceptional job both demand feeding the information the student is requesting and teaching the child how to find their own information to answer their own questions - i.e. independent research.

When I work privately with adults or children who I have identified as "Intuitive Learners," I teach them who they are, that their kind of "different" is in the same light as Hans Christian Andersen's "Ugly Duckling" and that they are White Swans. My job is to first try to overcome the emotional/psychological damages and start the process as soon as possible to build high self-esteem, and then self-confidence enough to last the rest of their lifetime.

Next I teach them what they have not learned in the past, Math and Algebra, which brings them current and is the process by which they build the necessary self-esteem and self-confidence. Then I teach them how to do independent research and where and how to find the answers to their questions on their own without tipping their hand to anyone, especially if they are children and need to keep a low profile in the classroom and preserve their relationships with their peers.

If they are Introverts, their peer relationships are not as important to them as they are if they are Extroverts, so I also test their Personality to find out how much they need their peer group and I also want to find out if they are naturally able to organize and structure of if they need some additional help in these areas and if I need to teach the parent(s) about their other needs for social interactions and structure or organizing.

My view is holistic, always, but I have to prioritize so that new foundations can be built and then I need to work swiftly to build them and help support the student through the process and then be able to turn the reins over to them because the amount of time that I will have with them will be limited to only days, or maybe only hours, so there is a great deal to be accomplished in very little time.

I said previously that I have used the process of teaching Math and Algebra to adolescents who were in Mental Hospitals when I recognized the negative effects which I saw as damages caused by the struggling "Intuitive Learner" in environments which tear them down rather than helping them to develop into normal, healthy human beings. The results were phenomenal, but I was never able to document in my notes the real reason I was teaching them Math and Algebra. It was both my secret and the secret of the patients who I worked with, but it looked innocent enough to the "establishment" that I was never challenged on it. But the adolescents and I had a secret pact on the subject and they didn't share the information with anyone else, but learning the secrets of what and why and then how... took them out of the Purgatory where they had been living for as long as they could remember.

Our children are like blocks of clay and we can shape them into their potential and then set them free to continue that process and find happiness and success in life. Or we can shape them into however much of a mess that the "system" and ignorant parents can manage to accomplish and

then we see the bullying which victimizes them in school and the rest of the story has too often been seen in the headlines in the forms of violence and suicide.

Let me also point out that when it comes to Math and Algebra, it's not only "Intuitive Learners" who have been left confused and unable to do Math and Algebra. The problem lies in the lack of understanding in the teacher who never understood it back in school when s/he was a student, who is most likely Right Brained and probably Concrete, and fluffs past teaching it to meet only the most basic requirements in elementary school, so that neither the Concrete nor Abstract students "get it."

The problem is then greatly exacerbated as the students lack the Math foundation they will need in High School when they go to separate classes for Math and Algebra and these classes are taught by Left Brained teachers who probably lack the good communications skills that the Right Brained teachers have, but fully own Math concepts and are not very able to transmit them to the minds of the students. I could tell some horror storied here, but I will not take the time.

The students who were already lost before they got to High School Math probably drop out unless they are lucky enough to have a Center Brained, Abstract Thinker Math Teacher who understands their subject, has the good communications skills to both present the material simply and logically, to answer questions effectively, and also can be patient enough and creative enough to keep finding ways to present information to the students until they finally "get it." Center Brained Math Teachers are rare, but if you ever have one, you will note that the contrast between them and the Left Brained Math Teachers is truly staggering.

So, the disabilities in Math and Algebra for both Concrete and Abstract students can be equal, but the negative developmental effects on the Abstract "Intuitive Learner" can be devastating while the effects on the Concrete students is that they tend to only memorize the lessons to regurgitate on the end of chapter exams, struggle through the final exams with lower grades, and then just shrug it off as something they will never use again anyway. If they later become elementary school teachers, they will struggle with Math and Algebra in college and just continue to teach the same inadequate Math and Algebra lessons which they learned for yet another generation. It's like abuse which goes on from generation to generation with no break in the cycle.

I have taught Math and Algebra to adults in classes where they were mixed between Concrete and Abstract students. Both types were very relieved to finally understand Math and Algebra and both were happy that they really were "smart enough," but the effects on the Abstract "Intuitive Learner" adult students in my classes were profound and life changing, and usually they went through a period of anger first.

None of this ever had to happen, but I have no unrealistic hopes that a Concrete Educational System will ever be able to change and recognize and support the "Intuitive Learner," so I have become a "Quiet Revolutionary" and "Army of One" doing what I can, when I can, and how I can. And being regarded as a "Nut Case" only tells me that I am targeting the right channels because what I do for the "Intuitive Learner" will always rankle the Concrete Thinkers who rule the Institutions which cater to the Concrete World, which is why I am usually very careful about who I give information to and how. If I can just get the students through the Concrete systems and into University, which is the Abstract World, there is still hope for them and that they can use the knowledge to finally reach for Happiness and Success and achieve their Dreams.

So, I long ago decided that not everyone has to understand me or what I am trying to do, because I am NOT going to be able to change the world. It's only important that there is enough understanding for me to get to those who need the help and then provide it the best way I can. I know that running counter to the 75% majority is always going to be dangerous, but this is never a job for wimps. Wimps don't make changes in the world. I am willing to take the hits; I agreed to this when I first "signed on."

Next, we will begin the Math and Algebra and, regardless of whether you are a Concrete or Abstract Thinker, you will be shocked at how simple it really is when it is presented logically and simply. We will start with Fractions because this is where every single adult and child has told me they got lost in school. Concrete teachers usually present Fractions as pieces of pie or pizza and that's where they lose both the Concrete Learner and the "Intuitive Learner." We will NOT talk about pie or pizza... We will talk about numbers... plain and simple.

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The True Meaning of Fractions

Once you learn what a Fraction really is and how to read it, you will understand also how you can do Math using Fractions. Once I figured this out as an adult, it opened a whole new world to me. I hope it will do the same for you.

Whole Numbers:

Mostly when we are working with Math we are dealing in whole numbers. We count all sorts of things in our environment. How many blocks do we need to drive to get from home to work? How many eggs are there in a carton? How many years old are we? What is the age of our car... how many cars went past the green light at the intersection at exactly 5 PM. Everything around us can be both qualified and quantified. Everything has substance which has some sort of quality to describe it and everything also has some quantity attached to it. How many of them are there? How many more do we want or need? How many are left after we give some away, sell some, consume some? Dealing with numbers in our environment is inescapable. Numbers organize Time and Space for us to function within.

And if we are going to run a business, dealing in numbers means how many of various items we need to buy and sell; how much we need to charge to make how much profit; how much our cost of doing business amounts to, how much we need to earn to pay our overhead; and how much we need to have left over after our expenses to put in our bank to call "profit."

Being able to understand and use numbers effectively and accurately is essential to not only running a successful business but also is essential to just get along in a structured world which is organized by all sorts of numbers, including time.

The most simple form of numbers we deal with on a daily basis is "Whole Numbers," all those numbers which we can count from 1 to as far as we need to count. Those numbers which are between the whole numbers have a more abstract quality to them. They are called "Fractions" and that is what we are going to deal with here.

Fractions:

If I have "less than a whole number," or "less than one," I have a Fraction. Without spelling this out, it can be an abstract concept which my not lend itself easily to understanding, so I am going to spell it out using very concrete and tangible examples.

Let's say that I have a box of 6 marshmallow bunnies... or at least I had one the last time I looked. But, now I go back to get them and someone has eaten one of the marshmallow bunnies. So, I have a box which is supposed to contain 6 marshmallow bunnies and one of them is missing now. I no longer have a WHOLE box of 6 marshmallow bunnies. Now I only have a PARTIAL box.

Yes, I do have 5 marshmallow bunnies now, but I was counting "boxes" of marshmallow bunnies, NOT individual bunnies. Maybe I wanted to give that box of 6 marshmallow bunnies to someone as a gift, but I can't do that now, because now that someone has taken one out of the box, I no longer have a whole box anymore... now I only have a partial box, which I cannot give as a gift unless I just want to take the bunnies out and wrap them individually and give them as individual bunnies... 5 of them to be exact.

I no longer have a whole box of bunnies. Now I have a partial box, not one whole box anymore, so I can't address this box as a whole number, called "one box of marshmallow bunnies." Now I have to express it as a partial box which would be explained as the fact that the box, if it were whole, would have 6 marshmallow bunnies. Now that one is missing, it is no longer whole and as a box, I would have to express it as a total possibility of 6 marshmallow bunnies, if it were a full box, but now I only have 5 out of a total possibility of 6 marshmallow bunnies, so I would say that I only have a partial box, or a "fraction of the whole box of bunnies" left.

There is a Math "shorthand term" for describing what I have now. That "shorthand term" is written with the total number that should be in the box, if it were full, at the bottom of a "fraction bar" and the number which is actually there written above the "fraction bar" as a shorthand way of saying that there are only 5 bunnies present in the box which would hold 6 bunnies if it were a full "Whole Box."

The shorthand way that I would write how the box of bunnies is now described would be 5/6ths, which means that "out of a total possibility of 6, which would make a full box, I only have 5," so the box cannot be called a "Whole Number" and be described as ONE full box of marshmallow bunnies. I would need someone to give me another marshmallow bunny to put into the box and then I would have ONE Whole Box again and it would be full and could be described as 6/6ths, which is shorthand for saying that "out of a total possibility of 6 bunnies which would fill the box, I DO have ALL 6, so I no longer have a "Partial Box" and now I have a "Whole Box," which no longer needs to be expressed as a fraction to describe it.

However, if I wanted to show the details of how the box could be described, I could say 6/6ths and that would show anyone who could read the shorthand that the full box should contain 6 marshmallow bunnies and all 6 are, indeed, present, so I have ONE Whole Box of marshmallow bunnies. This is why 6/6ths can also be called "ONE."

So, when we see a Fraction written out, it is really shorthand telling us that the number below the fraction bar describes how many are needed to fill the box so it can be described as the "whole number" of ONE BOX, and the number on the top of the fraction bar describes how many are truly there. If it is less than the number needed to the fill the box, it is expressed as a "Fraction" and we can clearly see how many we need and how many we have.

Once you realize that a Fraction really is shorthand to describe a situation, and you can read that shorthand, then you can also do some easy Arithmetic using that shorthand to solve Math problems.

For instance, if someone asked you to figure the percent (%) of marshmallow bunnies you had in the box, you would need to know that there are other ways to read the very same shorthand. Another way to read the shorthand is that the number on the top can be divided by the number on the bottom to express the very same Fraction as a "Decimal." The term "Decimal" is just another way of saying that we have done some Math with the Fraction and now we have expressed the same "less than one whole" something in another variation of Shorthand. This shorthand is called a "Decimal" and the only difference between it and the Fraction is that we can do more Arithmetic with the Decimal form, so we can solve some problems.

For instance, let's do some Math with the partial box of marshmallow bunnies. I will use 6 here since I have boxes of 4 on the following handout, so you can see both possibilities.

If I had 5 "out of a total possibility" of 6 marshmallow bunnies in the box, I could also read that as 5 "divided by" 6 and get a number which would end up being the exact same way to describe the partial box, but expressed as a Decimal. Okay, let's do that now. If we divide 5 by 6, we end up with .83, so that we can express the situation with the box of bunnies in two kinds of shorthand: 5/6ths or .83.

Now, let's say that we were trying to solve a practical problem using these numbers. Let's say that someone asked you: "What is the percent of marshmallow bunnies which is actually in the box?" Here's how you would solve that problem, using this information in a practical way:

1. Count the number of total bunnies which should be in the box if it were full.
2. That number would be 6.
3. Draw a fraction bar and put a 6 below it so that you have a shorthand expression of " /6ths."
4. Now count how many bunnies there are actually in the box.
5. That number would be 5.
6. Now put the 5 at the top of the fraction bar to get the shorthand expression of "5/6ths."
7. Now look at that shorthand expression and remember that there is another way you can read it.
8. Read it as "5 divided by 6."
9. Do the Math now of dividing 5 by 6 and you will get .83.
10. Realize that the .83 just represents another way that you can express shorthand for a fraction and that "5/6ths" and ".83" are just two different ways to describe the situation of the partial bunny box.

Now that you have translated the fraction into a decimal, both meaning the same thing, you can use the decimal to do some more Math, that you could not do with the fraction. If you multiply the .83 by 100, you can convert (change) it to a percent. Remembering that you are really multiplying by 100 is okay, but this is one time when I suggest using a shortcut trick and simply moving the decimal point two places to the Right and hang a Percent Sign to the Right of wherever the new decimal place ends. (As an example, if you had started with a longer number like .2345 and you moved the decimal point two places to the right and then stuck a percent sign after it, that number would end up being 23.45%)

Now you have changed the name of this shorthand expression from "decimal" to "percent." You are really multiplying by 100, which is why you move two places to the right as if adding the two zeros in 100 to the number. I seldom suggest shortcuts, but this is one exception which I do suggest. Later in the another lesson, we will talk about decimals and how to convert them, but for right now, to answer the question about "what percent of bunnies you have in the box," simply move the decimal point to the right by two places and you can answer that you have "83%" bunnies in the box, or the box is "83% full." If there was another question about what percent are you missing, you could just subtract the 83% from 100% and you could say that you are missing 17% of the bunnies needed to make ONE whole box.

Let's add the rest of the steps to finish solving the problem:

11. Now multiply the .83 by 100 to change it to a percent (%).
12. Or, even better, move the decimal point to the right two places and add a percent sign to get 83%

If you want to double-check to see if the 17% is correct, then set up your problem to focus on the 1 out of 6 that is missing from the box and set up your fraction as "1/6th" and read the fraction as "1 divided by 6" which will give you the decimal .17. Then move the decimal point two places to the right (the shortcut for multiplying by 100) and you will get the 17% which is missing from the box, as we determined above. In that case we could say that the box is missing 17% of its contents.

Now, please look at the handout which I will include next and study the lesson using boxes of 4 and groups of people in a "word problem" and you will get a better idea of how useful this "shorthand" really is for helping you to solve problems easily, quickly, and in a very straightforward manner. Many word problems, which have scared so many students, and even many teachers, can be solved using this method. Yes, I have taught teachers how to do this. I just have to be more diplomatic because they don't like to accept the reality that they really don't know how to do Math as well as they should.

Now, please study the first handout...

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The True Meaning of Fractions

$\frac{1}{4}$ = "one fourth"

$\frac{1}{4}$ = "one over four"

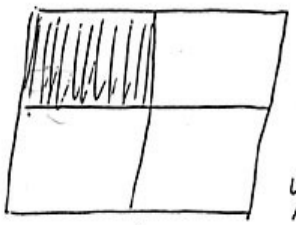
$\frac{1}{4}$ = "one quarter"

(All the ways to read a fraction)

$\frac{1}{4}$ = "one out of a total possibility of four"

$\frac{1}{4}$ = "one divided by four"

$\frac{1}{4}$ = $\frac{\text{one}}{\text{a total possibility of four}}$ out of =



All four of these equal parts added together make one whole - or 100% of what we are talking about. $\frac{4}{4} = 1$ (or 100%)

When we write $\frac{1}{4}$, we mean that we are only referring to one of the four equal parts which make up the whole.

If we recognize that "$\frac{\text{one}}{\text{four}}$ out of" may also be read as "$\frac{\text{one}}{\text{four}}$ divided by," then we can divide the one by four to find out what percent of four the one is:

$4\overline{)1} = 4\overline{)1.0}$ .25 = .25% = 25%

1.0 − 8 = 20; 20 − 20 = 0

So, one out of four is the same as 25%

If you get 8 answers correct out of a possible 10 answers:

$\frac{8}{10} = 10\overline{)8} = 10\overline{)8.0}$ .8 = 80% = 80% correct

80 − 80 = 0

If 200 people are outside singing and 20 of them are women, what percent of the group is female???

Total in group = 200 = $\frac{20}{200}$

Part of group = 20

$\frac{20 \text{ out of}}{200}$ is same as: $200\overline{)20.0}$ .1 = 10%

20.0 − 200 = 0

So, 20 is 10% of the group of 200.

Adding Fractions:

a. With Common Denominators -

Keeping in mind what Fractions represent, let's talk about adding them. For this exercise, make believe that you work in a Marshmallow Bunny warehouse where you are going to be filling orders for marshmallow bunnies.

Let's use the examples on the handouts so we don't have to re-invent the wheel:

In the example for Adding Fractions, we are going to add 2/4 + 3/4 = ?

I always prefer to set up a problem using the Vertical, rather than Horizontal method, but that is too hard to do using the keyboard, so I will explain it Horizontally, but I suggest that you set it up and work it Vertically as in the handout.

Again, make believe you are in the warehouse and you are combining the bunnies from two partial boxes. From the fraction we can see that each box can contain a total of 4 bunnies to be a whole box, but one box has only 2 bunnies out of a possibility of 4 and the other has 3 bunnies out of a possibility of 4. So, if we were to add them together using the actual boxes opened in front of us, we would see that we have two boxes which could contain a total of 8 bunnies, but we only have a total of 5 bunnies combined from both boxes.

So, if we added the 2 + 3 bunnies = 5 bunnies total, and we have two boxes which could each contain 4 bunnies, we would have one full, whole box of 4 bunnies and then a partial box with the "leftover Louie" single bunny, and we would end up with 1 and 1/4ths boxes of bunnies.

Doing this by strict Math, we would bring down the bottom number, the 4 (Denominator -which means the number we divide by), place the fraction bar above it, and then bring down the total of the two numbers at the top [5] (Numerator - which means the number we are dividing).

When we do this, we get 5/4ths, which becomes an "Improper Fraction," meaning that it expresses more than just a partial box so it's not the right shorthand to define something which is more than ONE whole, since a fraction is only shorthand for something which is less than ONE whole.

We need to divide the top number by the bottom one and we get "4 goes into 5 one time with 1/4ths left over." The answer is "1 1/4," which is called a "Mixed Number," and it really represents the ONE whole box of 4 plus the partial box containing the 1 out of a total possibility of 4. If we added another 3 bunnies to the second box, we could have 2 full Whole Boxes, but we don't have 3 more bunnies, so we could sell the whole box if we had an order for it, but we don't have a second full Whole Box to sell.

NOTE: If you are working with fractions and you get lost and don't know what to do next, remember that a fraction is read several ways and the most important are:

1. Top number is how many out of the total possibility of the bottom number.
2. Top number divided by the bottom number.

So, if you have a single fraction left and are stuck and have no idea what to do next, try dividing the top number by the bottom number and see what you get. That might be just what you needed to do and you may be off and running toward finding a percent by moving the decimal point two places to the right and adding a % sign.

b. With Un-Common Denominators -

The second problem on the handout is more complicated. We have one box which should hold a total of 4 bunnies, and only has 2 in the box. Then we have another box which should contain a total of 8 bunnies to be a whole box that we could sell, but it's a partial box because it only has 3 bunnies inside. The bunnies are the same and we can see that if we add them, we will have 5 bunnies but would it be "5 out of a possibility of 4" or "5 out of a possibility of 8?"

To answer this question, requires us to do some "magic" with the numbers...some "smoke and mirrors" stuff to try to get something called the "Lowest Common Denominator."

Now, what we need to do is find a number which each of the numbers on the bottom (Denominators) will go into...which is why that Denominator would be called "Common" meaning that both Denominators would go into it evenly with nothing left over. You could think of that in Concrete terms by asking yourself to think about the boxes themselves and think about whether or not they could be placed into one another or if there would need to be a larger box which they could both fit into. This is a little more Abstract, but if you just keep this handout with you when you have to Add, Subtract, Multiply, and Divide fractions, you won't forget how this works.

The way to get a Common Denominator is to multiply the two Denominators together; that way each Denominator will go into the one which they have in Common. Or, you could look at them and see if one of them will go into the other. Looking at both 4 and 8 as numbers, you can see both numbers will go into 8 evenly. 4 will go into 8 two times and 8 will go into itself one time. So, we will establish that 8 is the "Lowest Common Denominator."

If we didn't see this right away, we could multiply 4 times 8 and get 32 as a Common Denominator, but it's a pretty big number to have to deal with, so we would like to look for a smaller number which both 4 and 8 could each be divided evenly into. We could multiply 8 by 2 and get 16 and both 4 and 8 could "go into it" evenly. But, it's still a bigger number than we need to deal with. We are looking for the "Lowest Common Denominator" because it will be a smaller number and much easier to deal with. But, if you panicked and couldn't remember what to do, it would still work if you multiplied them together; you would end up having to reduce them later, but it would still work in a pinch.

If we look again at the two Denominators, we can see that 8 is the "Lowest Common Denominator" because both 4 and 8 will "go into it" evenly. "Evenly" means with nothing left over. 4 goes into 8 exactly 2 times evenly with nothing left over and 8 goes into 8 one time evenly with nothing left over.

So, we go back to our problem and start to apply the "magic" and change both Denominators to 8. But, there is more "magic" to be done because we have to make some changes to the numbers of bunnies in the Numerator.

We have to set the problem up a little differently, so put an equal sign (=) next to each fraction in the problem and we need to translate into some new numbers next to the original numbers. Put a fraction bar and an 8 below each one next to each fraction.

Now for the rest of the "magic" and the "smoke and mirrors."

On the 2/4 = /8, we need to put a new number for the numerator in the new fraction so we say "4 goes into 8 two times and then we multiply the original Numerator of 2 times the number of times that 4 goes into 8 (2) and that now becomes 4." So, the fractions change to 2/4 = 4/8.

On the 3/8 = /8, we need to do the same thing to make everything come out even. So, we say "8 goes into 8 one time and one time 3 is 3," so the 3/8 = 3/8 remains the same in this example.

Now we are dealing with boxes of 8 instead of boxes of 4 and boxes of 8, which makes things much easier to work with in the warehouse. We add the 4 bunnies from the first box to the 3 bunnies from the second box and we have a total of 7 bunnies to put into a box which would be full, and a whole box if it had 8 bunnies. We do not have 8 bunnies to fill it, so it still remains a partial box and is expressed as a fraction using the shorthand of 7/8ths.

Before we get more complex dealing with Subtraction, I will give you the handout which goes with this lesson and you can study it to get a clear idea of what I am saying before we go on.

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Fraction Fun And Mentals

Adding:

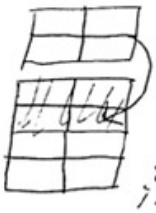
$$\begin{array}{r} \frac{2}{4} \\ +\ \frac{3}{4} \\ \hline \frac{5}{4} \end{array}$$

$= 1\frac{1}{4}$

If you have trouble finding a common Denominator, multiply the 2 Denominators Together

$$\begin{array}{r} \frac{2}{4} \rightarrow \frac{4}{8} \\ +\ \frac{3}{8} \rightarrow \frac{3}{8} \\ \hline \frac{7}{8} \end{array}$$

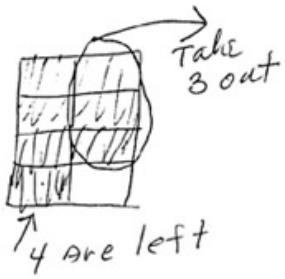
2 times 2 is 4
4 goes into 8 two times
8 goes into 8 one time
one time 3 is 3



Use 8 As the Denominator As 4 goes into 8 And 8 goes into 8.

Subtracting:

$$\begin{array}{r} \frac{7}{8} \\ -\ \frac{3}{8} \\ \hline \frac{4}{8} \end{array}$$

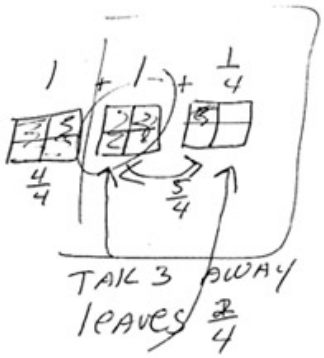


$2\frac{1}{4} = 1 + \frac{4}{4} + \frac{1}{4} = 1\frac{5}{4}$

$-\ \frac{3}{4} = \qquad = \frac{3}{4}$

CAN'T DO
HAVE to Borrow

$1\frac{2}{4} = 1\frac{1}{2}$



Multiply: $\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3 = 6}{3 \times 4 = 12} = \frac{6}{12} = \frac{1}{2}$

Multiply Top to Top
Multiply Bottom to Bottom

Division: $\frac{2}{3} \div \frac{1}{4} = \frac{2}{3} \times \frac{4}{1} = \frac{2}{3} \times \frac{4}{1} = \frac{2 \times 4}{3 \times 1} = \frac{8}{3} = 3\overline{)8}\ 2 = 2\frac{2}{3}$

change to multiply
Invert second fraction

Subtraction of Fractions:

Again, please put yourself in the Marshmallow Bunny Warehouse and we will use the same examples as are on the handout.

On the example we have 7 out of a possibility of 8 so we are making a shorthand statement that we have a box which will contain 8 bunnies if it is full, but it is not full as it only contains 7 bunnies.

Now we are setting up an Arithmetic problem whereby we are subtracting 3/8ths, which still says that the total amount which would be in the box is 8 but we are asking you to take 3 of them away. It's easy enough to take 3 bunnies away from 7 bunnies and see that we have left 4 out of a total possibility of 8.

Now we have a box which would hold 8 bunnies if it were full but we have taken 3 of them out, possibly to give to someone to eat, and we now have only 4 left out of a possibility of 8.

If we "reduced" that fraction to the lowest form, we would reduce it to 1/2, or "one half" because both the top number, the Numerator, 4, and the lower number, the Denominator, 8, can be divided in half and that would make the 4 reduce to 2 and then the 2 reduce to 1 and then the 8 reduce to 4 and the 4 reduce to 2.

Or, if you feel comfortable enough in doing it a longer way, you can say that 4 will go into each number evenly, so 4 will go into 4, 1 time, and 4 will go into 8, 2 times, which is a faster way of reducing it to 1/2, 'One half."

If you are not comfortable enough with Math to figure that, you can reduce both the top and bottom numbers by 2, 3, 4, 10, or any number which they both have in common. For instance, if you had a fraction like 25/75ths, you could say that 5 goes into both of these numbers, so 5 goes into 25, 5 times, so put a 5 at the top of the fraction bar. Then 5 goes into 75, 15 times, so put a 15 at the bottom of the fraction bar.

Oh, now you can see that this fraction could be reduced some more because 5 would still go into itself 1 time and it would go into 15, 3 times, so you can reduce the fraction down to 1/3rd.

Had you realized in the beginning the 25 goes into 75 three times, you could have divided both numbers by 25 and gotten your 1/3rd right away. But, when you have Math anxieties, sometimes you get a brain block and can't figure this out fast enough under pressure, so, rather than wasting time struggling and trying to think straight, just use the long way and keep cutting it down until you have it reduced as far as you can go. On the next handout, you will see an illustration of how to do this.

In the second Subtraction problem we can see that we cannot take 3 bunnies from 1 bunny, so we have to do something we have used before in Subtracting Whole Numbers. We have to “borrow.” But, you ask, where do we borrow from in this example?

We see that we are trying to take 3 bunnies out of a possible 4, which means that you can visualize a full box as having 4 bunnies and this box as not being full because it only has 3 bunnies.

But we are working in a warehouse and we look at our inventory and see that we have 2 full boxes of bunnies in addition to the two partial boxes containing both 1 bunny and 3 bunnies.

So, we look at the 2 full boxes and realize that if we break 1 of them open, we will have 4 more bunnies in one of them, and we can "borrow" from it so that we have the 4 which come out of it and the 1 which we started out with.

Now we have 1 full box plus 1 box of 4 which has been broken open, plus the 1 lone bunny.

So, if we add the loose bunnies, we have 1 full box and 5 loose bunnies now. Now, we can take the required 3 bunnies from those and we have some loose ones left over. We have 1 full box and 5 loose bunnies and we are going to take away from that 3 bunnies, so we end up with 1 full box and 2 out of 4 remaining, or 2/4ths, which reduces down to 1/2, so the answer is that after taking away 3 bunnies, we have 1 full box and 1/2 or 1 1/2 left over in the end. And this is what our really doing when you subtract fractions.

Multiplying and Dividing Fractions:

Unlike Whole Numbers, Multiplying and Dividing Fractions is easier than Adding and Subtracting them.

In these problems, it works best for you to write them horizontally, as in the examples in the handout.

Multiplication:

Simply multiply top number to top number and then bottom number to bottom number. Once you get your answer, you will then reduce the answer to the lowest possible fraction. You may also end up with an "Improper Fraction" where the top number is larger than the bottom one, so you will use the other way to read a fraction as "top number divided by bottom number." This will reduce your fraction.

For instance if you ended up with 9/4ths, you would divide and say that 4 goes into 9, 2 times with 1 leftover, so you would get a mixed number of 2 1/4th. At this point you could visualize in your mind that you have 2 full boxes of 4 bunnies each and a partial box left over which only has 1 bunny left in it. You would still be dealing with having 9 bunnies all together, but 8 of them would be filling two boxes. We will explore Mixed Numbers a bit more on the next handout.

Division:

Division works the same way as Multiplication but you first have to flip the second fraction so that the positions of its numbers are reversed upside down from how they were originally.

In the case of the example, the 1/4th is flipped to become 4/1 and then the usual Multiplication takes place of multiplying top to top and bottom to bottom.

If you are asked to divide a fraction by a whole number, just place a 1 under a fraction bar and put the whole number at the top. For instance if you were asked to divide 2/4 by 5, you would first rewrite that as 2/4 divided by 5/1. Then you would flip the 5/1 to become 1/5th. Then you would have the problem restated as 2/4 divided by 1/5th. Now you would multiply top to top, which will give you 2, and then multiply bottom to bottom, which will give you 20, so your answer will be 2/20ths. Now, simply divide each number in half and you will end up with 1/10th as your final answer.

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Mixed Numbers:

This is just another shorthand way to express that we have some whole boxes and some partial boxes. In the example on the handout, we have 2 full boxes and one partial box with only 3 bunnies inside. The 4 under the fraction bar tells us how many a full box would contain, or what 100% would be. So, we can look at the mixed number and tell that the 2 which represents 2 full boxes really tells us that there are 8 bunnies tucked away in those two full boxes. The 3/4ths tells us that there are only 3 bunnies in that partial box, so it's easy enough to add the 8 from the 2 full boxes and the 3 from the partial box and see that we have 11 bunnies all together, or an "improper fraction," which would be expressed in shorthand as 11/4ths.

If we did the only Math we could do with that "improper fraction," we would end up dividing the top number, 11, by the bottom number, 4, and we would be back at 2 ¾ th again. So you can see that they really are the same but expressed as two different kinds of shorthand.

These are small numbers so they are easy to work with, but what if you had very large numbers to work with?

On the handout, you will see a formula for how to figure the Math. You multiply the whole number (2) by the denominator (4) to get 8, and then you add the numerator (3) to get the improper fraction of 11/4ths.

Cross Canceling Fractions:

Often people get confused between multiplying and cross-canceling fractions. Keep in mind that when we multiply fractions, we multiply top to top and then bottom to bottom. When we cross-cancel, we are trying to reduce the numbers to smaller, more manageable numbers. In order to cross-cancel, the diagonal numbers must be divisible by the same number or they cannot reduce. In the example on the handout the 50 and 150 are both divisible by 50. On the 30 and 300, both numbers are divisible by 30.

So, they can be reduced to make them small enough to be worked with more easily. When you have finished reducing by cross-cancellation, then you can multiply or divide, whichever function you need to do, and you will find that it is easier when the numbers are smaller.

Reducing Fractions:

Most people who have anxieties about Math look at a large number, get a mental block, and can't see the forest for the trees when it comes to seeing the most obvious solutions. If you are not under pressure, you will see immediately that 240 is half of 480 so, in a calm frame of mind you can easily say that 240 goes into 240, 1 time, and put the 1 at the top of the fraction bar. Then you would say that 240 goes into 480, 2 times, and put the 2 at the bottom of the fraction bar. You would arrive at ½ pretty quickly that way.

However, if you have a Math Anxiety, like many people have, you could find yourself drawing a blank under pressure. Rather than stressing out over it, just look at the two numbers and see if they can be divided by 2, cut in half so to speak. If they can, just start cutting them in half top and bottom. You just have to make sure that you divide each number by the same number or they will come out uneven.

If you divided the top number by 2 and the bottom one by 10, they would not come out the same. So, it's important that you remain consistent and always do the same thing to bottom what you did to the top. If you can see that both the top and bottom numbers
could be divided by 3, or 5, or 7, or 10, or any number which they both have in common, use that number, but be sure to use it on both the top and the bottom so that the ratio of change will remain in proportion on both ends.

This is just a trick to keep you staying on task and making progress while you get your confidence and get past your mental block enough to keep going and not lose any time. At some point, you will regain your composure and be able to complete the problem calmly and get it right.

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More Fun With Fractions

Mixed Numbers: $2\frac{3}{4} = 2 \times 4 + 3 = \frac{11}{4} = 4\overline{)11}\ \text{R}\ 3 = 2\frac{3}{4}$

2 times 4 plus 3

Cross Cancel Fractions: $\frac{\cancel{50}^{\,1} \times \cancel{30}^{\,1}}{\cancel{300}_{\,10} \times \cancel{150}_{\,3}} = \frac{1}{10} \times \frac{1}{3} = \frac{1}{30}$

You can reduce diagonally only in multiplication problems and Division (only after you have converted to multiplication format). After reducing by cross cancellation, multiply top to top and bottom to bottom as usual.

Reducing Large Fractions:

$$\frac{\cancel{15}\ \cancel{30}\ \cancel{60}\ \cancel{120}\ \cancel{240}}{\cancel{480}\ \cancel{240}\ \cancel{120}\ \cancel{60}\ \cancel{30}\ 2} = \frac{1}{2}$$

Instead of wasting time struggling, if the numbers are even, cut each one in half until you can no longer do so. If you end with numbers with 0's or 5's at the right, try to divide by 5 or 10.

Just as there is shorthand to describe fractions, there is also a form or shorthand to describe Decimals.

The term "Decimal" comes from the Medieval Latin "Decimalis" and refers to numbers which can be subdivided into 10ths or 100ths units: 10th, 100th, 1,000th, 10,000th, 100,000th, 1,000,000th, etc.

Since it is all shorthand, so that it can be expressed more easily, if we say that 4/10th is the shorthand for 4 out of a total possibility of 10 (or 4 divided by 10) and we say that .4 is another way of saying exactly the same thing, we can say that we have more than one form of shorthand for expressing the same Mathematical relationship. This is what confused so many of us when we were in school and the teachers did a poor job or no job at all in trying to teach us what this is all about.

Given that these are various forms of shorthand to say exactly the same thing, let's take the first expression on the next handout and look at all the ways that the very same thing can be expressed:

1. 4/10ths (less than a whole)
2. 4 out of a total possibility of 10 (4 bunnies in a box which would hold 10 if full)
3. 4 divided by 10 (the basic way to do Math with this expression)
4. 2/5ths (by reducing the above fraction by 2, or in half at the top and at the bottom)
5. .4 (the decimal shorthand form which we get after dividing)

If you thought you were "Math disabled," as I did in school, then they pretty much lost you when they began playing with all these different formats and tried to tell you that each time you were looking at the same thing. It was as confusing as telling you that 4/4ths is the same that as "1" and that 84/84ths is the same thing as "1."

Had your teachers understood this, most of them were Right Brained enough to have been able to communicate it to you. But they didn't understand it any better than you did, which is why you also could not convey it to your children when they were struggling with their homework.

If you are reading this just out of curiosity and had no problems with Math, then either you were lucky and had good teachers, or you are Left Brained and "got it" despite poor teachers, but you probably couldn't explain it to your children when they struggled through this stuff trying to do their homework, and there is every possibility that you made them cry when you got frustrated with them and they began to mentally shut down and they are still mentally shut down when it comes to Math. If that is the case, then you have another chance now to reconnect with them and try to redeem the situation.

And now read the story of The "Secret Decimal Society" and the next time you see Fraction, think of the following magic:

The "Secret Decimal Society" - How to Understand and Convert Decimals

Just as there is shorthand to describe Fractions, there is also a form of shorthand to describe Decimals.

The term "Decimal" comes from the Medieval Latin "Decimalis" and refers to numbers which can be subdivided into 10ths or 100ths units: 10th, 100th, 1,000th, 10,000th, 100,000th, 1,000,000th, etc.

Since it is all shorthand, so that it can be expressed more easily, if we say that 4/10th is the shorthand for "4 out of a total possibility of 10 (or 4 divided by 10)" and we say that .4 is another way of saying exactly the same thing, we can say that we have more than one form of shorthand for expressing the same Mathematical relationship. This is what confused so many of us when we were in school and the teachers did a poor job or no job at all in trying to teach us what this is all about.

Given that these are various forms of shorthand to say exactly the same thing, let's take the first expression on the next handout and look at all the ways that the very same thing can be expressed:

1. 4/10ths (less than a whole)
2. 4 out of a total possibility of 10 (4 bunnies in a box which would hold 10 if full)
3. 4 divided by 10 (the basic way to do Math with this expression)
4. 2/5ths (by reducing the above fraction by 2, or in half at the top and at the bottom)
5. .4 (the decimal shorthand form which we get after dividing)

If you thought you were "Math disabled," as I did in school, then they pretty much lost you when they began playing with all these different formats and tried to tell you that each time you were looking at the same thing. It was as confusing as telling you that 4/4ths is the same thing as "1" and that 84/84ths is the same thing as "1." Had your teachers understood this, most of them were Right Brained enough to have been able to communicate it to you. But they didn't understand it any better than you did, which is why you also could not convey it to your children when they were struggling with their homework.

If you are reading this just out of curiosity and had no problems with Math, then either you were lucky and had good teachers, or you are Left Brained and "got it" despite poor teachers, but you probably couldn't explain it to your children when they struggled through this stuff trying to do their homework, and there is every possibility that you made them cry when you got frustrated with them and they began to mentally shut down and they are still mentally shut down when it comes to Math. If that is the case, then you have another chance now to reconnect with them and try to redeem the situation.

And now, read the story of The "Secret Decimal Society" and the next time you see Fractions, think of the following magic:

4/10:

To quickly convert a Fraction to a Decimal, look below the fraction bar to see how many zeros there are because you can ONLY convert a fraction with one 1 and all zeros below the fraction bar to a Decimal. You canNOT use this method to convert a fraction with any other numbers below the fraction bar quickly to a Decimal. For instance, you canNOT convert 1/8 or 2/3 or 7/34. In cases such as these, you would have to actually do the Math and divide the top number (numerator) by the bottom number (denominator) to get the same fraction expressed as a Decimal.

The quick conversion method described in this handout is for Quick Conversion without having to do the dividing. This method is "Smoke and Mirrors Magic" like moving the decimal point 2 places to the right and adding a Percent Sign to convert a Decimal to a Percent. It is really the same as Multiplying by 100 to get the Percent. This Quick Conversion from Fraction to Decimal is pretty much doing the opposite as it is Dividing to get rid of the fraction bar and adding a decimal point.

So, the business of converting Fractions to Decimals and Decimals to Fractions is "Magic" done with "Smoke and Mirrors" to save you time so you don't have to do the Math. The Math for this would be Division just as the Math for turning Fractions into Percents is Multiplication.

In this case of 4/10, we have ONE zero below the fraction bar, so it means that we will place a decimal point on our paper and the actual number which will be written to the right of it will contain only ONE digit, or ONE "place." If we were converting 4/100, we would look below the fraction bar and see that there are TWO zeros, so it would tell us that we need to put a decimal point on our paper and then the number which we would put to the right of it would need to take TWO places. We could NOT put it as .40, because that would make it "forty," so we have to put a zero to it's left to make TWO "places" and not change the power of the number as it needs to maintain a power of "four."

So, we put the decimal point on the paper and add a zero to make a second place for the two zeros in the 100 below the fraction bar, and this gives us .04. The power of the number is still there as "four" but the decimal point is the shorthand which tells us that we are viewing a fraction which would have a 10ths or 100ths denominator and it identifies it as having a denominator which has TWO zeros because of the TWO places that the 4 occupies. So, we can read the .04 as "four hundredths" and see it in our heads as being the same as 4/100. For 4/10,000ths, we would put the decimal point on the paper and we would have to add THREE more zeros to express this as a Decimal as .0004.

[**Note**: Think in terms of the "power of the number" as taking however many places as its power occupies in digits, so add the necessary number of zeros to its left as are needed to make up the number of zeros below the fraction bar.

For instance, if we were converting 425/10,000, we would consider that "425" only occupies three places and we would still put the decimal point on the paper and add one more zero. In this

case, our Decimal would end up as .0425. To convert this back to the fraction, we would drop the decimal point and put a fraction bar on the paper, write the power of the number as 425 above the fraction bar, and then count how many digits are to the right of the decimal point (four in this case), and write a "1" below the fraction bar and that number of zeros after it - in this case, four, so would be back at 425/10,000.]

To convert the previous Decimal .0004 back to a fraction, we would drop the decimal point and put a fraction bar on the paper. Then we would look at the power of the number that is in the decimal. In this case, it is "four," so we would put that number at the top of the fraction bar. Then we would look at the number of "places" in the Decimal and include the "4" in that count. Including the "4," we have FOUR places, so we put a "1" at the bottom of the fraction bar, and then place the same number of zeros to the right of it as "places" in the Decimal. In this case, we need to put FOUR zeros to the right of the "1," and we end up with 4/10000.

Now, place the comma to the left of each three zeros (as is the convention in writing numbers to separate them by a comma after three digits reading right to left) and we end up with a fraction which reads 4/10,000 or "four ten thousandths."

As per the original fraction, you could divide the 4 by 10 and get the same .4, but the shorthand way to do it is to drop the fraction bar, put the decimal on your paper, and put the number to the right of the decimal point using the same number of places as there are zeros in the number below the fraction bar. And, do please remember that you can only do this "Magic" when there is a "1" with zeros in the denominator. If there are other numbers below the fraction bar, this Quick Conversion shortcut will NOT work.

Now, to add a bit more to the mix -

You can also cancel zeros, if you like, to reduce a larger fraction like 2500/100,000 to smaller numbers which are easier to work with, if that is what you are asked to do on a problem or test, or if you need to work Math using smaller numbers.

For instance: In the case of 2500/100,000, you can cancel out two zeros from both the top and bottom numbers and reduce this fraction to a smaller one of 25/1,000. You must do the same thing to both top and bottom or it will not work. You could not take two zeros from the top and a different number from the bottom. They must always maintain the same ratio, so you can take two from each side of the fraction bar and no more. If you did the long division and reduced it in the beginning, it would end up the same in the end, which is written as a Decimal of .025.

If you are taking a test and you are asked to reduce the fraction or the decimal, then this is how it would end up. However, if you are to just make the conversion without reducing, it will end up .02500. Even though these expressions all look different, the Mathematical value remains the same, but expressed with different "shorthand." This is why I was so confused in school and probably why you were, too. I forced myself to figure this all out when I was an adult in college determined to slay this dragon once and for all... And I did!

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Putting at all together....

Keep in mind that a problem is only a problem until you find a solution and there is no such thing as a "handicap," once you have found a way to conquer it. Watch that guy with the Titanium legs cross the finish line in the Special Olympics and ask yourself as you sit on your butt in the grandstands eating your hot dog who really is the "handicapped" person in the place.

The best way to get a grip on this stuff is to just play with it until you can predict what will be the end result of the math and use your calculator to check your results. If your calculator automatically reduces it, you may feel confused, so find a more basic calculator so you can check your results. I have a very advanced Statistical calculator so when I use it to divide 40 by 1,000,000, I get a useless result for this purpose because it has done all kinds of reduction and conversion for me, so I get “4.00 -05.”

If you get an unhelpful result like this on your calculator, use a numerator which has no zeros like 367/1,000,000 and you will get .000367.

I hope this takes you back to the days of confusion so many years ago and clears the dark clouds away. When I have completed writing this Math and Algebra Course, my job here will be finished, so, hopefully, like Johnny Appleseed, you can help me to spread the seeds of this help to those who need it as far as your travels take you. There's a whole population across all ages who needs this help and there's a whole population who has no idea and are clueless that this problem even exists. They may think that writing such a course is a silly pursuit. Some of us know better, though.

If you need the help, please take what you need and share it freely. Just don't "sell" it for money as it is intended as a philanthropic "gift" to all who need it. Being a successful Entrepreneur means being able to manage numbers successfully. I am doing what I can to help you in this respect and then you need to come back here to

the ECN and ask for the help from those who can teach you beyond this point how to apply what you have learned and learn the rest of what it takes to be a successful Entrepreneur. After this course is completed, and you have begun to overcome your Math Anxiety, please join and begin to ask questions. I don't have those answers for you, but those waiting here to serve you have as many answers as you can develop questions to ask.

The Socio-Economic System needs to be rebuilt. Soon, I will have completed the "Socio" part and the rest is up to you if you wish to put your feet on the path to the fulfillments of Happiness and Success. There is no such thing as a "free lunch." You really do have to invest if you wish to get dividends. The good thing about it is that the "investment" is time, energy, and heart and soul stuff and the dividends are for you, your loved ones, and your country.

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The "Secret Decimal Society"

BACK IN ANCIENT times (before PAPER had been invented) All written MATERIAL had to be chiseled into stones. It was fairly EASY to chisel A whole NUMBER like 1, 70, 100, or 55, but A NUMBER which represented less than 1 whole WAS something more complex - called A "FRACTION." A fraction WAS written AS one NUMBER over ANOTHER NUMBER - which required A great deal of chiseling.

Because most of the record keeping had to do with money, and the money system WAS based ON 10's; 100's; 1,000's; 10,000's; 100,000's; AND 1,000,000's, the scribes were falling over from exhaustion. Something had to be done!

One moonlit evening, the most powerful scribes called A secret meeting to form the great "Secret Decimal Society." During their MANY hours of debate, they devised A shorthand METHOD for representing the fractions which stated what portion of 10; 100; 1,000; 10,000; 100,000; or 1,000,000 was to be chiseled on the stone record.

It WAS decided THAT if they WANTED to record 4 out of A possible 100, INSTEAD of chiseling it AS "$\frac{4}{100}$," they would chisel A big dot - CALLED A "decimal point" - ON the ROCK to MEAN that the NUMBERS following the dot represented less THAN 1 WHOLE. Then they decided that the number following the dot would have to have AS MANY NUMBERS, AND "decimal places" AS there were zeroes IN the NUMBER which belonged IN the bottom of the FRACTION - even if zeroes had to be added to MAKE the required NUMBER of places: $\frac{4}{100}$ would be written AS .04

With the NEW shorthand system, the members of the "Secret Decimal Society" could chisel their records MORE QUICKLY - AND with less effort. It WAS A MAJOR breakthrough IN the field of ACCOUNTING.

Now that you KNOW the secret decimal shorthand system, you are A NEW member of the "Secret Decimal Society." AS A fringe benefit, you MAY buy your stones AT discount! LARGE, FLAT stones AT 40% off AND factory seconds AT 60% off. HAPPY chiseling!

Bulky Fraction	Number of Zeroes IN Bottom Number	Number of places Needed after Decimal	shorthand/Decimal Form of Fraction
$\frac{4}{10}$	ONE	ONE	.4
$\frac{4}{100}$	TWO	TWO	.04
$\frac{25}{100}$	TWO	TWO	.25
$\frac{4}{1000}$	Three	Three	.004
$\frac{250}{1000}$	Three	Three	.250
$\frac{40}{1000}$	Three	Three	.040
$\frac{4}{10,000}$	Four	Four	.0004
$\frac{2500}{100,000}$	Five	Five	.02500
$\frac{40}{1,000,000}$	Six	Six	.000040

Positive and Negative Numbers – Adding

Students are confronted with Positive and Negative Numbers just about the time when Algebra is in the wings and on it's way. I found Positive and Negative Numbers less confusing as things went along, which was very surprising, because I was totally lost in the "Adding" process of them and I partially understood in college what I was supposed to be doing in the "Subtraction" process ONLY because it seemed so much like syllogisms in Logic, but I had no idea why I was doing things that way in Math.

I had to back up pretty far, as an adult challenging myself again in college, before I was able to grasp what this was all about. When I began to explain it to myself in terms of money, it began to make sense to me, so I've been teaching it in terms of money ever since to students and it seems to make sense to them, also. I will also present it to you in terms of money.

First thing I want you to do is just throw out the word "Adding" because this process is anything but "adding." It's Adding and Subtracting, so when it was first presented to me as a young student, I totally balked at the word "Adding" and no one was ever able to explain to me why it was called "Adding Positive and Negative Numbers," when there were some times when I was Adding and some other times when I was clearly Subtracting.

So, please just throw that word out completely and let's call this "Combining" Positive and Negative Numbers.

First, let's look the handout and at the top where we have something called a "Number Line." This is like a weird sort of ruler which has zero in the middle and then each mark to the right of the zero has a "Positive" value all the way up the large end of the ruler. To the left of the zero, all the numbers are the same, but they each have a "Negative" value. If a number has a Positive value, we are really "adding" it but shhhhh... don't use that word here because for each number that we throw into the mix that is a Negative number from the left side of the zero on the ruler, we really are "taking away," or "subtracting," but don't say that to another teacher or they will really confuse you.

We will just say that anything on the Right side of the ruler represents something which we really do have and has a real or Positive value, and anything on the left side of the ruler we really do not have or maybe we owe it to someone and it only has a value that says it's coming out of the pot as soon as someone antes up and there's something to drag out of the pot. If you have ever played Poker, you know what I mean. If not, just ignore what I said because as we go along, it will begin to make sense to you.

Look at the handout now. Read the values and make believe they are dollars. On the dollars which are Positive and have "+" signs, you either have this in your pocket or someone has just given it to you. On the dollars which have the "-" or Negative signs, you are either going to give away to someone else or you owe it and you will have to settle your debt as soon as you get some more money.

Let's say, for instance, that you just got your paycheck of $1,000 and you have $1,200 worth of bills that are due for payment. You are a grown-up and you can easily tell your friend that your paycheck is spent even before you get it. You know that what this means is that you get $1,000 and you own $1,200, so when you get your paycheck, it just reduces your debt from $1,200 to $200 because you just paid off $1,000 of the debt, but you're still in debt because you didn't have enough to pay it all off. If you have a garage sale and make $300, you now can pay off the rest of your debt and have $100 left in your pocket which really does belong to you and you are now debt-free.

This is how Positive and Negative Numbers work and the exercises in school, really, if you look at it logically, are to teach you how to manage your finances when you are an adult. Now, as an adult, you can look back at this and see that you have already learned these lessons from life, so re-examining this from your adult perspective will probably make it easier.

So, now, think NOT of Adding Positive and Negative Numbers, as they want to call it in school, but put your focus on your pocket (or bank account) and "combine" those dollars as they drift in and out of your possession and see how the "+" and "-" values determine which of these dollars you can keep and which ones you must pay out... and then see where you end up after all those Positive and Negative values are taken into account in your personal financial system.

Now read the list of what goes in and out of your pocket as I have defined it on the handout, and feel the empowerment which you now have over that scary old stuff they used to call "Adding Positive and Negative Numbers."

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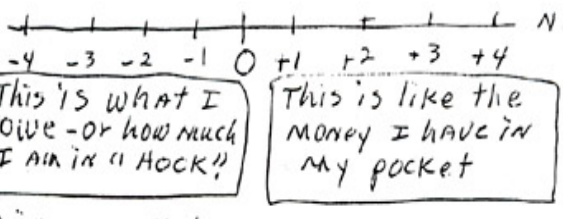
Positive + Negative Numbers

Adding (combining) ["Adding" is a poor word to use because in this operation we add + subtract amounts.]



+50 = I have $50 in my pocket
-10 = I give $10 to you
+40 = I have $40 in my pocket now
+5 = Tom gives me $5
+45 = I have $45 in my pocket now
-15 = Bill borrows $15 from me
+30 = I have $30 left in my pocket now
-20 = I contribute $20 to Salvation Army
+10 = I have $10 left in my pocket
-20 = The cable company says pay up or they disconnect
-10 = I just lost my $10 and now I'm $10 in the hole (in "Hock")
-10 = I borrow $10 from Sarah to pay the cable company
-20 = Now I am $20 in hock
-10 = I borrow $10 from my dad to buy dinner.
-30 = Now I'm $30 in hock
+10 = you pay me back the $10 I gave you earlier
-20 = I'm still in hock, but the $10 reduced my debt to $20.
+15 = Bill pays me back the $15 I loaned him
-5 = Now I only owe $5 in debts.
+15 = I get $15 for my birthday.
+10 = After deducting my indebtedness only $10 belongs to me.
-10 = Now I can pay Sarah back the $10 I borrowed
0 = I'm broke now, but I don't owe Any one. I'll birthday dinner At the Salvation Army.

Positive and Negative Numbers – Subtracting

Subtracting Positive and Negative Numbers was just as confusing to me as Adding, but when I applied what I had learned in my Logic courses, and renamed the so-called "Subtraction sign" as "not this" and called the process the "Not This Principle," I was able to make sense of it enough to do the problems - not that I have ever really understood why they made the rules the way they did with the stupid labels they put on them, but when I relabeled things, I found that I could do the processes successfully because my new labels made sense to me. So, I will teach you my labels and the processes which come logically from them.

In the so-called "Subtraction" problem in Positive and Negative Numbers, you will see the Subtraction sign or "-" in front of an element (like a set of parentheses) or a number inside of parentheses and be instructed to "Subtract" that quantity from another quantity. If you just change the label on the Subtraction Sign to read "Not This," then you can say that when you apply that so-called "Subtraction" to the numbers which it is supposed to act on, what it really does is change the sign of those numbers to the "Opposite Signs."

In the first example in the handout, you are told to take 5 plus 2 and then "Subtract" all the numbers inside the parentheses. My way of reading that is to say that the "Subtraction sign" is really saying that the 2 is not a +2 (as when there is no sign, it means that it is a positive or +) but the "not this" means that it is changed to a minus or a "-". The same will be true for all of the signs inside the parentheses and they are all changed to the opposite sign.

In this problem there is a second set of quantities inside another set of parentheses and the same thing happens here. The "Subtract sign" should be read as "not this" and so all of the numbers inside that set of parentheses will also change to the opposite signs. Look at the problem on the handout and you will see how the changes have taken place.

Now that you have done this, you will have a new set of both positive numbers and negative numbers with plus signs for the positive and minus signs for the negative ones. Now add up the column of positive numbers with "+" signs and then add up the column of negative numbers with "-" signs and then "combine" them as you did in the so-called "Adding" process of Positive and Negative Numbers and you will be able to solve the problem in the same way as we did with the money going into and out of the pocket.

The second problem in the handout may seem confusing because we are supposed to "Subtract" the quantity of 5 from negative 25. The "subtraction sign" will be outside of parentheses to show that the 5 is not negative but it is supposed to subtract from the -25. So, in reality, the quantity 5 is really +5 because if there is no sign on the number, it is assumed to be positive. So, we really have a problem where the quantity +5 is supposed to be "Subtracted" from the quantity -25. Keep in mind that the only thing the "Subtraction sign" really does is serve to mean "not this." So, if it is saying that the +5 is "not this," then it changes it to the opposite, which is -5.

Now that the so-called "Subtraction" process has been completed, we have left a -25 and a -5. That's about the same as saying that I'm $25 in debt (hock) and now I owe yet another $5, so I am now really $30 in debt. I would have to get $30 in my pocket just to break even and I would have to get a dollar just to have $1 in my pocket.

So, the only function that "Subtraction of Positive and Negative Numbers" serves is to reverse the signs on the numbers in the parentheses next to it. After that has taken place, you are now finished with the "Subtraction" function and ready to combine the numbers to see what you really have left.

Stupid huh? Well, I don't make the rules. If I did, they would be a lot easier.

Multiplication and Division –

As in the case of Fractions, the Positive and Negative values/signs for Multiplication and Division are much easier than for Adding and Subtracting.

Just memorize them and tuck this in the back of your mind.

In Multiplication and Division, if you are working with:

Like signs - the answer to the problem will be **Positive**.

Unlike signs - the answer to the problem will be **Negative**.

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At Last Algebra!

Algebra, my old nemesis, is the concluding section of this course, and what you have learned up to this point and the simple elements of introductory-level Algebra will culminate in a simple application of word problems and practical problems which will aid you in running your business.

Math will always be a fundamental core of business whether you are buying products at wholesale and reselling them at retail, buying materials to incorporate into your products or services, determining overhead costs to set service fees, or marking prices up or down for sales to keep current with the market and your competition. Being able to manage an accurate "Profit and Loss" accounting will be a make-or-break skill to guide you in your business. Yes, you do need to have a good understanding of basic Math in order to do this competently.

When I was a young student, I was only one of many who raised their hand in class and asked why we needed to learn Algebra and what earthly purpose it could possibly serve in the real world. I don't remember actually getting any kind of reasonable answer from any teacher to that question. I think the only answer I ever heard was something stupid like, "Because I had to learn it when I was your age and now it's your turn."

Maybe you need to become a wise, intelligent adult and reflect back on Algebra to really begin to appreciate it. When I began to do that, I realized that the great value of Algebra is that it trains you in how to solve problems and to do it logically, and step-by-step.

So, I will put Algebra together for you in a simple way that you can understand and you will be shocked at how easy it really is, and has always been... and you will shake your head that your teachers were unable to explain it to you so simply. And I would challenge you to think about the steps that you take to solve problems today as an adult... to think about it before you read the last section of this course and begin to appreciate the value of these Mathematical elements and how they could have become very useful tools for you had they only been presented to you in a way that you could understand.

I will attempt to do that next....

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Problem Solving 101 - or "<u>The Saga of Joe and Fred</u>"

There are certain principles and steps which must be applied when we are trying to solve a problem. As adults, we have been struggling with these challenges for many years. We have either developed successful strategies for problem solving on our own over the years or not. Though it certainly did not seem apparent at the time, Algebra was part of the school curriculum for the purpose of teaching us problem solving.

But, as in most elements set in place in institutions of government, including the educational institutions, those who set them in place died long ago, and those who picked up the baton since

either had no vision or have long since lost the vision regarding why those elements were there in the first place and how they should be applied to be effective.

Given the fact that Jean Piaget was so well-recognized in his discovery of and definition of the normal Stages of Human Development that his guidelines were accepted in all the fields of Human Behavior social science and in the formal academic institutions, it was accepted by all of these Social Science and Education communities that on a global level, only 35% of all human beings would ever develop the ability to do "abstract reasoning" and that would not happen until approximately age 16.

Now, this is definitely NOT one of my theories. This was drilled into my head all through college on both the undergrad and graduate levels in the courses that I was required to take in pursuit of my Psychology degrees. I later related it to my studies in Personality Theory to the approximately 25% of the global population who have iNtuition as a fundamental part of their Personality, but that's another topic which I do not plan to address here.

Logically, if this is a fact well-accepted by academicians, and it is agreed that Algebra requires abstract thought, why on Earth would the public school system impose it on children around the age of 12 or even earlier? I'm not an educational historian and I do not plan to do any research on the subject, but I have to wonder if back in the "good old days" when real education was delivered to students and even in one-room school houses, students less than 16 years of age were beaten over the head with Algebra.

And I further have to wonder if back then when it was imposed was it equally imposed on 100% of students or only those who were college-bound, which might have been the 25% to 35% which fall into both the iNtuition and Abstract Thinker ranges which are recognized today in both the fields of Personality and Human Development. Incidentally, the first college course that I took where Jean Piaget's "Stages of Human Development" were part of the curriculum was "Educational Psychology" and then I was reintroduced to him again in "Human Development," which I took twice in two different colleges by two different course names, but they were identical materials.

My point is that the public school system so much believes in Piaget's Stages of Human Development that it is a foundation for the education of students pursuing degrees in both Education and Psychology, so that begs the logical question that if they believe that abstract thought will only ever develop in 35% of the global population and only beginning around age 16, why on Earth are they demanding that 10 and 12 year olds are being forced to learn the most abstract subject of all when by their own standards that's patently impossible?

Let's have a little refresher lesson on the differences between Concrete and Abstract thinking.

First of all, if you are a Concrete thinker, you are NOT reading this course and you stopped reading anything that I write and have labeled me a "nut case" because what I talk about is outside of the realm of the five senses. Concrete thinking can only wrap itself around what can be perceived by Seeing, Hearing, Touching, Smelling, Tasting. What exists in theory cannot be perceived by any of the five senses and only lives in the theoretical imagination.

The idea in Algebra of "finding X" lives well beyond the five senses and it makes no sense at all to a Concrete thinker. Also, Concrete thinkers live and function only in the present and they

make decisions based on immediate gratification to the five senses, so the ideas about self-empowerment and self-enrichment and intangible, non-material acquisitions seem like a waste of time and energy when they prefer to trust what passes the acid test of their five senses and becomes solid and provable and has an immediate value to them and demonstrates an immediate gratification.

Solving X cannot pass any test in the Concrete world of the five senses and most of what I teach and deal with also fails the acid tests of the five senses. No one has ever come to me for any kind of help on any level who was a Concrete thinker and only an Abstract thinker who can see into the future and can develop theoretical models and set goals for happiness and success in the future (tomorrow or ten years away) has the awareness and sees the logical needs for the tools which will enrich their journey to their future goals. That is also why those who I teach about relationship development are all abstract.

Concrete couples can be very satisfied with acquiring tangible things in their relationships: money, cars, boats, houses, food, etc. Abstract couples desire those things, also, but they are less important than the intangible qualities that build strong and happy relationships that will last a lifetime: respect, trust, love, recognition, freedom from conflict, fun, play, intimacy, shared dreams, etc.

Piaget's 65% of students would need basic Math to help them acquire the money they will need to acquire the material things in life which will bring them happiness and fulfillment and that is true for the 75% of the Sensor population recognized by Personality Theorists who fall into that same Concrete thinker mindset.

That means that between 25% and 35% of the global population (and they may or may not be fully represented in any public school population) will have the brain architecture to perceive theoretical concepts in their minds and imaginations and be able to see the value in ideas and be able to fit theories into their visions of how they see themselves moving toward their personal goals in the future.

Also, I would remind you here that I also developed an educational concept which I call "Intuitive Learning," whereby Abstract thinkers must build complete models on all subjects which interest them so they can push them into long-term memory where they are then stored as Knowledge.

Next we will pursue the Abstract-Theoretical Model of how to "find for X" - or, in terms of the practical value in Algebra, we will outline the steps in Problem Solving as described in the Algebraic models of "Finding for X."

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True Life Problem Solving - Pre-Algebra

There are logical steps in Problem Solving. I will state them simplistically and then translate them to Algebra.

Solving Problems - General Steps:

1. Identify and focus on the problem.
2. Determine its relationship with other factors.
3. Strip away the other factors to isolate the problem and see it in its most simple form.
4. After it is isolated, solve it.
5. Prove that your solution is correct so you know it is solved.
6. Interpret the meaning of the solution and its value.

Most of the problems we deal with in everyday life become buried in complexities and we find that "we can't see the forest for the trees." In solving an Algebraic problem, we simplify the problem by clearing away the "forest" and focusing on the "tree" which is our concern. By so doing, we have most of the problem solved already. It's the complexities surrounding problems which keep us from seeing them clearly and we are unable to solve a problem until we can see it clearly... naked, if your will, isolated away from all the other issues which are attached to it.

Some of those issues, and most often this is true, are fears and lies which are intended to keep us from seeing the heart of the problem, so being able to clear away all of the extenuating complexities of fears and lies and misinformation intended to keep clouding the "forest" to obscure the "tree" will be what is necessary before we even stand a chance at solving it. I think that in most cases, the solution stares us directly in the face and becomes an easy thing once we have cleared away all of the attached complexities, and the distance from isolating and recognizing the problem to the solution of the problem is really a very tiny one and may be accomplished in one small step.

Algebra teaches us the steps we need to take to go from having a problem to solve to finally finding the solution, solving the problem, testing and proving that we have solved the problem, making sense of the situation, learning the lesson, putting the new information into our body of knowledge, and moving on.

Solving for X - "The Saga of Joe and Fred"

In the handout which goes with this lesson you will see two characters, Joe and Fred, on a seesaw or teeter totter, whichever you prefer to call it. Both Joe and Fred weight 150 lbs, which means that they are in total balance as they sit on the seesaw and keep it fully horizontal over the balance point in the middle. If one of them loses weight, the seesaw will no longer be in balance as the heavier one will now fall to the ground and the one who has lost weight will be up in the air.

The idea here is to ALWAYS keep the seesaw in balance. The reason for that is that Joe and Fred sitting in absolute balance on the seesaw represents an Algebraic Equation. Equation means "Equal" and it describes the fact that the seesaw rests on a pivot in the middle which is really an

"equal sign" and that "equal sign" means that everything that is Joe and sitting on the left side of the seesaw has to always weigh exactly the same as everything that is Fred and sitting on the right side of the seesaw.

At no time can we do anything at all that will disturb the equality of the weights on each side of the seesaw and cause the seesaw to lose its absolute balance.

In translating this to an Algebraic Equation, you see that the Equal Sign "=" is the pivot point under the seesaw that states that this Algebraic expression called an "Equation" is Equal because everything on the left side weighs exactly the same as everything on the right side - even if they look absolutely nothing alike. In looking at the Equal Sign "=", we know that.

We might be able to look at all that sits on each side of the seesaw (Equation) and recognize some of the elements, usually numbers, but they don't make a lick of sense to us at all. And then there is this mystery thing which we really don't understand at all because it's only identified as "X" so we really cannot figure out who both Joe and Fred really are.

In the first Equation on the handout, we can clearly see that Fred is "5," but who Joe is seems pretty mysterious because he seems to be "2," but he's also something else that we can't really make any sense of just now. However, we are told that since he and Fred must be equal, then all of who Joe is must be "5," but only part of that "5" is revealed to us and the "X" must represent some "mystery number," which we don't know, yet, but it is now our job to find out.

So, we are challenged to find out what number is really hidden below that mysterious "X" which stands for some number which is part of "5" and when combined with the part of Joe that we already know, "2," will end up being the same "5" that Fred weights. So, we have only part of what Joe weighs and now it is our job to find out the "mystery number" which is represented by "X," so we are going to "solve for X" or "find X" and the steps that we are going to follow will be the same steps that we follow in real life to solve all problems.

General Idea Behind Solving for X:

1. We have Identified "X" as the problem to be solved.

2. The attached factor to X is 2.

3. 2 is being Added to X.

3. To strip 2 away from X on Joe's side, we must Un-Add from Fred to maintain balance. Un-Add means to Subtract it from Fred. Now it is gone from both sides and the equation is still balanced.

4. After we Isolate X by Un-Adding 2 from Fred, Joe is now represented by X alone and the Equation states now that X=3, so it states that the "mystery number" is 3.

5. To test and prove our solution, we plug 3 into the original problem and do the Math, so when we say "3+2"=5 and Joe is "3+2" and Fred is "5," we have proven that X really does = 3 because

3+2 does = 5, so the seesaw set up as Joe (5)= Fred (5), or "5 = 5" is correct so our solution has been tested and proven correct.

6. The interpretation of the problem is that the missing part of Joe is "3" and when added to the part of Joe which we already knew, which is "2," equals exactly the same "5" that Fred weighs. So, we have used known factors/data to fill in the "mystery number" which we did not know before and we used known information to solve our problems and to test and prove that we were correct in our solution.

Next, let's use these principles more explicitly to solve Algebraic Equations. We will start with the most simple ones and then all the complex ones will be viewed as just more stuff attached to the "mystery number(s)," just more "forest" to obscure the "tree," but with a road map to guide you through the process. In solving an Algebraic Equation, I always give students the same advice that I give myself:

"Do NOT look down the road at Tipperary or you might get overwhelmed. Just do the first most obvious thing and then after that do the next most obvious thing and then after that do the next most obvious thing... and keep doing that until you have finally come to the end... and then you will look up and be at the very gates of Tipperary and all that mess will be far behind you!"

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Solving the Equations

In solving any problem, you must ask yourself questions. Solving an Algebra problem is no different. Also, taking shortcuts is the road to chaos and hazard. Never take shortcuts. Always write down your steps in detail line by line. This is the reason why regardless if you came up with the right answer on your Algebra problems or not, if you did not show the steps, one by one, that took you to your solution, you lost either part or all of the credit for your work. That will always be a rule for problem solving and for solving Algebra problems.

Some problems can become really long and complex and if you skip steps or don't write them down, you may (let's say "will" here) end up lost in the forest like Hansel and Gretel when the birds ate their breadcrumb trail. No shortcuts...and write down each step in detail. Those are hard and fast rules. Just do it!

Here are the questions to ask yourself to solve the problems on the handout:

X + 2 = 5

1. What number does X represent? So, I need to solve for X.

2. How do I Isolate X to get it by itself?

3. What is hanging onto X?

4. 2 is hanging onto X.

5. What is 2 DOING TO X? (You only want to find what a number is "doing to X." If X is doing something to a number, then it will be a different kind of problem, probably a "Ratio and Proportion Problem," which is solved a different way.)

6. How do you Un-do what the 2 is doing to the X?

7. The 2 is ADDING to the X.

8. To get rid of the 2 and Isolate the X, you must take the 2 across the Equal Sign to the other side and un-Add it from the other side, to get rid of it equally from the equation.

9. The opposite of Adding is Subtracting, so to get rid of the 2 and "Un-Add" it, take it across the Equal Sign to the other side and Subtract it.

10. Write down each step carefully as per the handout.

11. After the only attached number (2) has been removed from the Equation, and the seesaw is still fully in balance, what do you have left as the final step?

12. You have X= 3.

13. Does X really equal 3?

14. Find out by plugging the 3 into where X was before in the original equation and see if the Math proves to be correct.

15. Restating the original problem substituting 3 for X, we have:

3+2 = 5

16. Now do the Math.

3+2 does equal 5, so

17. 5=5 and Joe and Fred do, indeed, equal each other when the mystery number has been discovered as being 3 from all of the known factors and the left side of the seesaw (equation) equals the right side. If both sides are equal after solving for X and plugging in the resultant number, then you have proven your solution is correct.

If they are not equal, you have made an error and you need to recheck your steps to find your error and make the necessary corrections.

Now it is time to go to the handout and look at all of the forms of the simple Algebra Equation. There are only FOUR different functions that the attached number can "do" to your X and the way to "undo" the functions to Isolate your X, will always be to take them across to the other side, across the Equal Sign, and do the OPPOSITE Math function to remove them from both sides of the seesaw (equation) so you can strip them away one at a time and reveal what X is when it is is totally isolated on one side of the equation, which is your objective.

The only way to "Solve for X" is to keep stripping away anything that is attached to it until it is left totally alone on one side of the equation. It does not matter which side it ends up on as long as it is totally alone, but most people are more comfortable with it ending up on the left side.

I am not going to endeavor to teach you advanced Algebra here. I only want you to understand the basics which you missed in school and then I will give you the road map later to guide you through the more complex equations.

But, no matter how long and complex an Algebraic Equation is, your job remains the same, and your objective is always to strip away anything which is hanging onto the X by undoing whatever it is doing to the X - and keep doing that for each number or element attached to the X, step by careful step, until you finally end up with the very last line stating that X = (whatever your final answer ends up being).

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Here are the Math Functions and what you need to do on the other side of the equation to un-do them:

Adding - Take the number across the = sign and **Subtract** from the other side.

Subtracting - Take the number across the = sign and **Add** to the other side.

Multiplying - Take the number across the = sign and **Divide** the other side.

Dividing - Take the number across the = sign and **Multiply** the other side.

Notes:

Multiplication in Algebra can be expressed several ways:

3X means "three multiplied by the quantity which is represented by X"

3(3-2) means that the "quantity inside the parentheses is being multiplied by 3."

3 • 3 means that "three is multiplied by 3."

Division in Algebra is usually only expressed one way, but it may have several elements above or below the fraction bar:

X-3/2x means "X minus three divided by the quantity two times X."

3 X/2 means "three times the quantity X divided by two."

Now, please read through the steps of the four most basic Algebraic Equations. The fifth one at the bottom is a different kind of problem called "Ratio and Proportion" and I will cover it separately.

Enjoy "**The Saga of Joe and Fred**," which I have been teaching for many years to all age groups, but mostly to adults, as this entire course (which has up to now only ever been verbal), and all of the handouts, were developed for the college students I was teaching in the Center for Personalized Instruction at the local community college where the students who came to me for help were between the ages of 18 and 80.

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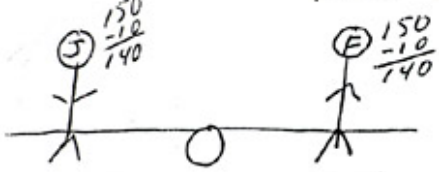
Equations

"The Saga of Joe and Fred"



Joe Fred

$X + 2 = 5$ "Some mystery # with 2 added to it equals 5."

$X = 5 - 2$ un-add the 2 to isolate X

$X = 3$

check

$(3) + 2 = 5$

$5 = 5$

Joe = Fred

$X - 2 = 5$

$X = 5 + 2$ un-subtract the 2 to isolate x

$X = 7$ "Some mystery # with 2 subtracted from it equals 5."

$(7) - 2 = 5$

$5 = 5$

Joe = Fred

$2X = 10$

$X = \frac{10}{2}$ un-multiply the 2 to isolate X

$X = 5$ "Some mystery # multiplied by 2 equals 10."

$2(5) = 10$

$10 = 10$

Joe = Fred

$\frac{X}{2} = 10$

$X = 10(2)$ un-divide the 2 to isolate the X

$X = 20$ "Some mystery # divided by 2 equals 10."

$\frac{(20)}{2} = 10$

$10 = 10$

Joe = Fred

Ratio + Proportion Equation

$\frac{10}{X} = \frac{2}{20}$ "10 is to X" as "2 is to 20"

Cross multiply

$\frac{10}{X} \quad \frac{2}{20}$

$2X = 200$ Now have Joe + Fred; "some mystery # multiplied by 2 equals 200."

$X = \frac{200}{2}$ un-multiply the 2 to isolate the X

$X = 100$

Check

$2(100) = 200$

$200 = 200$

Joe = Fred

Ratio and Proportion

I will only cover this briefly as it is not often used, but maybe it will solve a mystery for something you didn't understand in school, as I also didn't understand it.

One day when I was a college student, the class was sent outside to measure the shadow of a lamp post to determine the height of a tree. No matter how many times it was poorly explained, I really didn't get it well enough to store it in long term memory, but I "get it" now, so I'll share it with you.

Say you want to determine the true height of a tree and you only have it's shadow to measure to try to determine its height. How would you use that measurement to determine the true height of the tree?

The answer is that you find something nearby which also has a shadow, but you actually DO know its true height. So, you measure the shadow of that object which has a true height which you know and then you use a Ratio and Proportion formula to solve for the height of the tree.

In this case we will say that we found a lamp post and we know that it's true height is 20 feet and we measure it's shadow at the same time of day that we will measure the shadow of the tree and we plug the figures into a Ratio and Proportion formula:

Shadow of Tree - 10 ft "is to the" Shadow of the Lamp Post - 2 ft

as

Height of Tree - X "is to the" Height of the Lamp Post - 20 ft.

the forum must be: Shadow is to Shadow

as Height is to Height

Or Height is to Height

as Shadow is to Shadow

It really does not matter which order top to top or bottom to bottom the measurements are in but the same type of measurement has to be either in the top or the bottom of the formula so we are always comparing apples to apples and oranges to oranges, and not mixing them up.

So, the way I have it written in the handout is that I have both Shadows above the fraction bar and both Heights below the fraction bar. Now I am going to use the known quantities to figure out the unknown, which is, as usual "X."

I will set it up on the formula of Shadow of Tree 10ft = Shadow of Lamp Post 2 ft

Height of Tree X Height of Lamp Post 20 ft.

Now I will do the Math for this kind of problem:

10/X = 2/20

2X = 200 achieved by cross-multiplying to set it up as an Algebraic Equation so we can solve for X.

X = 200/2 (to un-multiply the 2 by Dividing on the other side of the equal sign)

X = 100

So, we are saying that by using this Ratio and Proportion formula and solving for X with Algebra, we have found out that the height of the Tree is 100ft relative to the known measurements which we were able to determine by measuring the shadows, knowing the true height of the lamp post, and then figuring the relationships between them using a formula which is a known tool for finding out such information by solving for X.

Word Problems

As a professional Educator, I do hear some things that would surprise students very much. One of them that I have heard before is when other teachers have admitted to me that they are terrified of Word Problems. It sure does take some of that "magic" away that I used to feel as an elementary school student when I was shocked to see one of my teachers at the store... out in the world... being human like all other human beings.

Math in the classroom has a purpose and the purpose is to teach students how to manage their lives, their finances, their families, their businesses because all of life is organized around numbers and other forms of organization such as seconds, minutes, hours, days, weeks, months, years, and dollars and cents. In order to get along in the world, we need to understand how these units of measure operate so we can work in concert with them and not fly in the face of them and get smashed in the process.

The next handout is designed to show you just briefly some of the shorthand associated with Word Problems and how you might set up a Word Problem to solve it.

When you listen to a Word Problem, first of all, DON'T PANIC! Start writing down on paper the known facts as you hear them. If you hear that there is a whole amount of something and you are dealing with a part of it, especially if you need to come up with a percent, chances are you will be dealing with a simple Fraction read as "X amount out of a total possibility of X amount equals what percent." Hey, you can do that! Just think about the marshmallow bunnies. Set up the problem as a fraction and just do the first most obvious thing and then the next most obvious thing instead of looking at the whole Tipperary of the thing and scaring yourself half to death.

Some buzz words you may want to listen for are "is" which usually means "equals" so you can think in terms of setting up a Joe and Fred. If you hear "of," that could mean "multiply." "What" or "how much" are words which are a dead giveaway for "X." Write these words down on paper and see if you can plug the rest of the numbers into some formula so you can do the Math.

On the next handout I have some simple variations of how to set up a Word Problem which might be helpful to you given the fact that I can't give you all the possibilities in the world.

Have fun and just remember to relax... and don't forget that some teacher only admit to other teachers behind closed doors that Word Problems scare the heck out of them, too. And, here's another secret about teachers.... They put their pants on the same way you do.

Don't let Word Problems scare you. Take a deep breath and remember to do the first most obvious thing. When you have done that, the next most obvious thing really does become obvious....

Good luck!

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Percent Word Problem Help

Problem: "5 is what % of 50?"

Method #1

"is"	means →	= (equals)
"of"	means →	multiply
what or How Much	means →	X (unknown)

"5 is what % of 50?" means the same as:

↓ ↓ ↓ ↓ ↓ ↓

5 = X times 50 which means the same as:

5 = 50X which means the same as:

Joe = Fred

(50)X = 5

X = 5 / (50) isolate the unknown, un-multiply the 50 by Dividing

$50\overline{)5.0}$ = .1

X = .1 = 10% (move decimal 2 places to right to change decimal to percent

Method #2 "5 is what % of 50?"

If 50 is the total amount you can have, then it is 100% of what you are considering to be possible. However, you only have 5 out of the total possibility of 50. You may write that as a fraction:

$$\frac{5 \text{ (out of)}}{50 \text{ (A Total Possibility of)}}$$

Because another way to read this same fraction is:

$\frac{5}{50}$ (Divided by) = $50\overline{)5.0}$ = .10 = 10%

If you can score a total of 100 points on a test, and you miss 20 questions and only get 80 points for credit, you have earned 80 out of a possible 100 points, which may be written as:

$\frac{80}{100}$, which can also be read as $\frac{80}{100}$ (Divided by) = $100\overline{)80.0}$ = .80 = 80%

Order of Operations

I mentioned to you before that I would provide you with a road map of how to solve more complex Algebra Equations. The Order of Operations tells you in what order you are to do functions.

Just remember "Please Excuse My Dear Aunt Sally" and you can't go wrong because that's the buzz phrase to help you remember in what order you need to do the more complex problems. Just make sure that you never take a short cut and never skip a step and you should be able to come out just fine.

I will include the handout for the Order of Operations and then after that a problem which I wrote on the board just arbitrarily and it was good enough to come out with a simple solution. Luckily, one of my students wrote the problem down as I was solving it on the board and I asked him if I could make a copy for my records because it ended up having all of the elements included, which is why I wrote it as I did. He also has an excellent handwriting so it will be a lot easier to read than my handwriting.

Enjoy!

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Order of Operations

Follow these steps to solve equations. DO NOT skip steps - copy Equation on a new line for each step or you may get lost. If you end with wrong answer, you will need to retrace your steps

① Please - ( ) Do All Arithmetic within parenthases first.

② Excuse X^2 Do exponents next $5^2 = 25$; $2^3 = 8$

③ My $*x(x)$ Do All multiplications $2(x) = 2x$

④ Dear $\div$ Do All Divisions $\frac{8}{2} = 4$

⑤ Aunt $+$ Do All Additions

⑥ Sally $-$ Do All subtractions last

* $-(x)$ is the same as $-1(+x) = -x$ because multiplication of unlike signs yield a Negative, and a Negative sign Alone really means -1.

ORDER OF OPERATION

$2(4) + \underbrace{(3-2)}_{=1 \text{ BRING DOWN TO EQ}} + 3^2 - \frac{4}{2} + 2x + 3x - x = 220$

DO YOU PRIORITY FIRST - PROBLEM SOLVER

$2(4) + 1 + \underbrace{3^2}_{=9} - \frac{4}{2} + 2x + 3x - x = 220$

$2(4) + 1 + 9 - \underbrace{\frac{4}{2}}_{=2} + 2x + 3x - x = 220$

$\underbrace{8 + 1 + 9}_{=18} - 2 + 2x + 3x - x = 220$

$\underbrace{18 - 2}_{=16} + 5x - x = 220$

$16 + 5x - x = 220$

$16 + 4x = 220$

$4x = 220 - 16 = 204$

$(4)x = 204$

$X = 204$

$x = \frac{204}{4}$

$x = 51$

DO ALL YOUR STEPS

Now this course is completed.

I hope that you will find this material useful to you and that you will join the ECN and ask the accomplished Entrepreneurs here questions so that they can help you to achieve your dreams.

I am happy to have been some small part of this effort and I wish you well...

And thank you for allowing me to have been of service.

"Coach Judi" Stifel

PS: As sloppy as they look, I did insert my old hand-written handouts just to keep the human quality in this Math lesson because it's so easy to forget that Math, and especially Algebra, was invented by human beings to serve the needs of human beings, NOT simply to torture us.

Oh, you did notice that the last handout is written in a much neater handwriting and still has the three holes from a notebook. One of my adults students in his 40's had copied it down in his notebook after I invented the problem in my head and solved it on the chalkboard. I asked him if I could keep it and he obliged by pulling it out of his notebook. (Thanks, Roland!)

Note: Roland was really afraid of Math, especially Algebra, but he understood it at last after this course and he went back to school and finished his degree and got "Straight A's"—even in "College Algebra."

You can, too! ☺

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