

**! Remember:** Learning styles are neither good nor bad and are based on genetics and environment. Knowing your best learning styles and using them effectively can dramatically improve your math learning and grades. **!**

### Visual (watching) Learner

**Visual learners learn best by seeing math**

Knowing that you are a visual math learner can help you select the memory technique that will work best for you. Repeatedly reading and writing down math materials being studied is the best way for a visual learner to study.

Based on the Learning Styles Inventory students who learn math best by seeing it written are Visual Numerical Learners. If you are a visual numerical learner you will learn best by following the 12 suggestions in Figure 14 on the next page. Try as many of these suggestions as possible and then select and practice those that are most helpful.

A visual way to decrease distractions is by using the “my mind is full” concept. Imagine that your mind is completely filled with thoughts of learning math, and other distracting thoughts cannot enter. Your mind has one-way input and output, which only responds to thinking about math when you are doing homework or studying.

### Auditory (hearing) Learner



*Auditory learners learn best by hearing information*

If you are an *auditory learner* (one who learns best by hearing the information) then learning formulas is best accomplished by repeating them back to yourself, or recording them on a tape recorder and listening to them. Reading out loud is one of the best auditory ways to get important information into long-term memory. Stating facts and ideas out loud improves your ability to think and remember. If you cannot recite out loud, recite the material to yourself, emphasizing the key words.

Based on the Learning Styles Inventory students who learn math best by hearing it are Auditory Numerical Learners. If you are an auditory numerical learner you will learn best by following the 12 suggestions in Figure 15. Try as many of these suggestions as possible and then select and practice those that are most helpful.

An auditory way to improve your concentration is by becoming aware of your distractions and telling yourself to concentrate. If you are in a location where talking out loud will cause a disturbance, mouth the words “start concentrating” as you say them in your mind. Your concentration periods should increase.

### Figure 14 — Visual Numerical Learners

These students learn math best by seeing it written. If you are a visual numerical learner, you may learn best by following these suggestions:

1. Use worksheets, workbooks, handouts, additional math texts and any other additional written materials
2. Play games with, and get involved in activities with, visual printed materials such as multiplication or algebra flash cards.
3. Use visually orientated computer programs, CD's, DVD's, homework programs and math websites like those mentioned in this text.
4. Check out videocassette tapes from the math lab or learning resource center.
5. Rework your notes using the suggestions in this text.
6. Make "3 x 5" note or flash cards putting the variables and numbers in different colors.
7. Use Study Stacks to develop your own virtual flash cards or use the virtual flash cards already developed ([www.academicsuccess.com](http://www.academicsuccess.com) – Student Math Practice and Learning Sites)
8. Use video websites from your text or [www.academicsuccess.com](http://www.academicsuccess.com) – Student Math Practice and Learning Sites.
9. Use different colors of ink to emphasize different parts of each math formula.
10. Visualize numbers and formulas in detail.
11. Ask your tutor to *show* you how to do the problems instead of *telling* you how to do the problems.
12. Write down each problem step the tutor tells you to. Highlight the important steps or concepts that cause you difficulty.

### Figure 15 — Auditory Numerical Learners

If you are an auditory numerical learner, you may learn best by following these suggestions:

1. Say the numbers to yourself or move your lips as you read the problems.
2. Record your class and play it back while reading your notes.
3. Read aloud any written explanations.
4. Make sure all important facts are spoken aloud with auditory repetition.
5. Read math problems aloud and try solutions verbally as you talk yourself through the problems.
6. Record directions to difficult math problems and refer to them when solving those specific types of problems.
7. Record math laws and rules in your own words, by chapters, and listen to them every other day (auditory highlighting).
8. Have the tutor explain how to work problems instead of just showing you how to solve them.
9. Explain to the tutor how to work the math problems.
10. Explain to group members how to solve math problems.
11. During the test, sub-vocally talk yourself through the problems.
12. Take the test in a private room and talk to yourself out loud to solve the problem.

## Tactile/Concrete (touching) Learner

**Tactile/  
concrete  
learners  
need to  
feel and  
touch the  
material  
to learn**

A tactile/concrete (kinesthetic) learner needs to feel and touch the material to learn it. Tactile concrete learners, who are also called *kinesthetic* learners, tend to learn best when they can concretely manipulate the information to be learned. Unfortunately, most math instructors do not use this learning sense. As a result, students who depend heavily upon feeling and touching for learning will usually have the most difficulty developing effective math learning techniques. This learning style creates a problem with math learning because math is more abstract than concrete. Also, most math instructors are visual abstract learners and have difficulty teaching math tactilely. Ask for the math instructors and tutors who give the most practical examples and who may even “act out” the math problems.

As mentioned before a tactile concrete learner will probably learn most efficiently by hands-on learning. For example, if you want to learn the FOIL method, you would take your fingers and trace the “face” to remember the steps. See Figure 16 (The FOIL Method). Also, learning is most effective when physical involvement with manipulation is combined with sight and sound. For example, as you trace the face you also say the words out loud.

Based on the Learning Styles Inventory, Tactile Concrete Learners best learn math by manipulating the information that is to be taught. If you are a tactile concrete learner, you may learn best by following the 12 suggestions in Figure 17, on the next page. Try as many of these suggestions as possible and then select and practice the best suggestions that help. If you do not have these manipulatives or don’t know how to use them, ask the math lab supervisor or instructor if they have any manipulative materials or models. If the math lab does not have any manipulative materials, you may have to ask for help to develop your own.

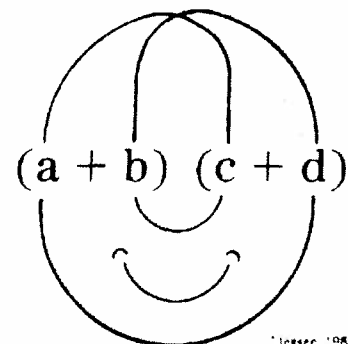
Tactile/concrete learners can also use graphing calculators to improve their learning. By entering the keystrokes it is easier to remember how to solve the problems. This practice is also an excellent way to remember how to solve the problem when using a calculator while taking a test.

Another way tactile/concrete learners can learn is to trace the graph with their fingers when it appears on the calculator. They should say out loud and trace every equation to “feel” how the graph changes when using different equations. For example, if you add 2 to one side of the equation, move your finger to where the graph changes and say out loud how much it moved.

A tactile/concrete way to improve your study concentration is by counting the number of distractions for each

**Figure 16**  
The FOIL Method

F (a) (c)  
O (a) (d)  
I (b) (c)  
L (b) (d)



FOIL is used to remember the procedure to multiply two binomials. The letters in FOIL stand for First, Outside, Inside and Last. To use FOIL, multiply the following

- the First terms ((a) (c)).
- the Outside terms ((a) (d)).
- the Inside terms ((b) (c)).
- the Last terms ((b) (d)).

To learn FOIL, trace your finger along the FOIL route.

study session. Place a sheet of paper by your book when doing homework. When you catch yourself not concentrating put the letter "C" on the sheet of paper. This will remind you to concentrate and get back to work. After each study period, count up the number of "C's" and watch the number decrease.

### Figure 17 — Tactile Concrete Learners

These students learn math best by hands on learning. If you are a tactile concrete learner, then you may learn best by following these suggestions:

1. Cut up a paper plate to represent a fraction of a whole.
2. Fold up a piece of paper several times and cut along the fold marks to represent a fraction of a whole.
3. In order to understand math concepts, ask to be shown how to use Cuesinaire rods or algebra tiles as manipulatives.
4. Try to use your hands and body to "act out" a solution. For example, you may "become" the car in a rate-and-distance word problem.
5. Obtain diagrams, objects or manipulatives and incorporate activities such as drawing and writing into your study time. You may also enhance your learning by doing some type of physical activity such as walking.
6. Try to get involved with at least one other student, tutor or instructor that uses manipulatives to help you learn math.
7. Ask to use the Hands-on Equations Learning System using manipulatives to learn basic algebra. You can go to their Web site ([www.Borenson.com](http://www.Borenson.com)) to learn more about this system and other systems to help you learn math.
8. Go to one of the "learning stores," usually in your local mall, to see if they have manipulatives.
9. Go to a K-12 learning resource store to see if they have manipulatives, such as magnetic boards, that you can put letters and numbers on and move around.
10. Talk to the coordinator of students with disabilities to see if they use manipulatives when tutoring their students with learning disabilities.
11. Tear up a piece of paper into several pieces and put an x on some of the pieces. Mark the other pieces with numbers 0 to 9. The pieces with the x can represent the variable and the other pieces can represent the numbers. You can now use the pieces of paper to set up and solve equations.
12. Use the virtual manipulative websites at [www.academicssuccess.com](http://www.academicssuccess.com) — Student Resource website or Google "college math manipulative".

### Social Individual Learner

If you are a social individual learner, learning math may best be done individually. You may learn best by yourself, working with computer programs and being individually tutored. In some cases, social individuals may have to meet in groups to develop practice tests but leave socializing to a minimum. If you are a social individual learner and visual learner, using the computer may be one of the best learning tools available. If you are a social individual learner based on the Learning Styles Inventory you may learn best by following the 10 suggestions in Figure 18, on the