

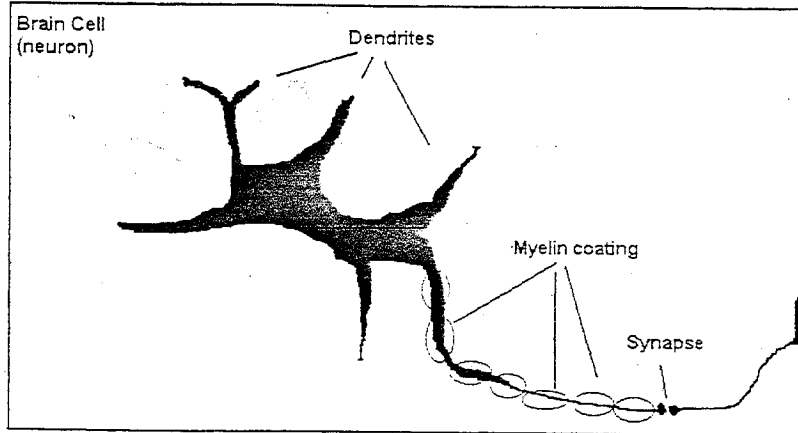
Your Brain-Friendly Guide to Success in Math

Your brain knows how to learn, just as your lungs know how to breathe. However, there are important things you can do to maximize your brain's ability to do its work. This short introduction will help you choose effective strategies to use while learning mathematics. This is a simplified explanation of a complex process; if you are interested in learning more about the brain, check the page 37 for additional resources. Also, the Website www.mathnotes.com has links to related brain Websites.

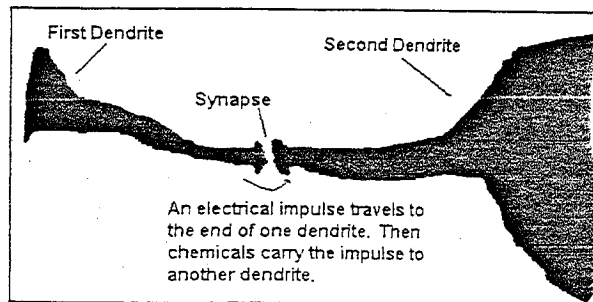
Your brain's outer layer is called the **neocortex**, which is where higher level thinking, language, reasoning, and purposeful behavior occur. The neocortex has about 100 billion (100,000,000,000) brain cells called **neurons**.

Learning Something New

- As you learn something new, threadlike branches grow out of each neuron. These branches are called **dendrites**.
- When the dendrite from one neuron grows close enough to the dendrite from another neuron, a connection is made. There is a small gap at the connection point called a **synapse**. One dendrite sends an electrical signal across the gap to another dendrite.
- *Learning = growth and connecting of dendrites.*



The above drawing shows a neuron with several dendrites. One of the dendrites has developed a myelin coating through repeated practice.



This drawing shows a close up view of the connection point (synapse) between two dendrites.

Remembering New Skills

- When you practice a skill just once or twice, the connections between neurons are very weak. If you do not practice the skill again, the dendrites at the connection points wither and die back. You have forgotten the new skill!
- If you practice a new skill many times, the dendrites for that skill become coated with a fatty protein called **myelin**. Each time one dendrite sends a signal to another dendrite, the myelin coating becomes thicker and smoother, allowing the signals to move faster and with less interference. Thinking can now occur more quickly and easily, and *you will remember the skill for a long time* because the dendrite connections are very strong.

Other Important Points

- You grow dendrites specifically for the thing you are studying. If you practice adding fractions, you will grow specialized dendrites just for fractions. If you **watch other people** solve fraction problems, **you will grow dendrites for watching, not for solving**. So, be sure you are actively learning and practicing.
- If you practice something the **wrong** way, you will develop strong dendrite connections for doing it the wrong way! So, as you study, check frequently that you are getting correct answers.
- As you study a new topic that is related to things you already know, you will grow new dendrites, but your brain will also send signals throughout the network of dendrites for the related topics. In this way, you build a complex **neural network** that allows you to apply concepts, see differences and similarities between ideas, and understand relationships between concepts.

Also remember that it does take time for dendrites to grow. Trying to cram several new concepts and skills in at the last minute is not possible. Your brain simply can't grow that quickly. You can't expect to develop huge muscles by lifting weights for just one evening before a body building competition! Practice the techniques **throughout the course** to facilitate good growth.

If you are under stress or feeling anxious, such as you might during a test, your body secretes **adrenaline** into your system. The presence of adrenaline in the brain blocks connections between neurons—in other words, you can't think! If you've ever experienced "blinking out" on a test, you've seen first hand what adrenaline does. You'll learn several solutions to that problem in the test taking activities.

CAUTION!

You must be in the right math course.

Why?

- If the course is too advanced, you won't have the dendrites for the background knowledge.
- You won't be able to connect the new information to your previously learned concepts.
- You'll be lost!
- If you are not sure you are in the right course, talk with your instructor at once.

Often, the first chapter of a math book will be review to help you reactivate your background knowledge. So even if it seems too simple at the beginning, look in later chapters to see the new material that lies ahead.

Start Your Course Right!

- Attend all class sessions (especially the first one),
- Gather the necessary supplies
- Carefully read the syllabus for the course.

Ask your instructor about class policies if you don't understand them. Then you will put yourself in the best situation for success. You will not only learn mathematics, but also how to become an effective student, using your brain's natural capabilities.