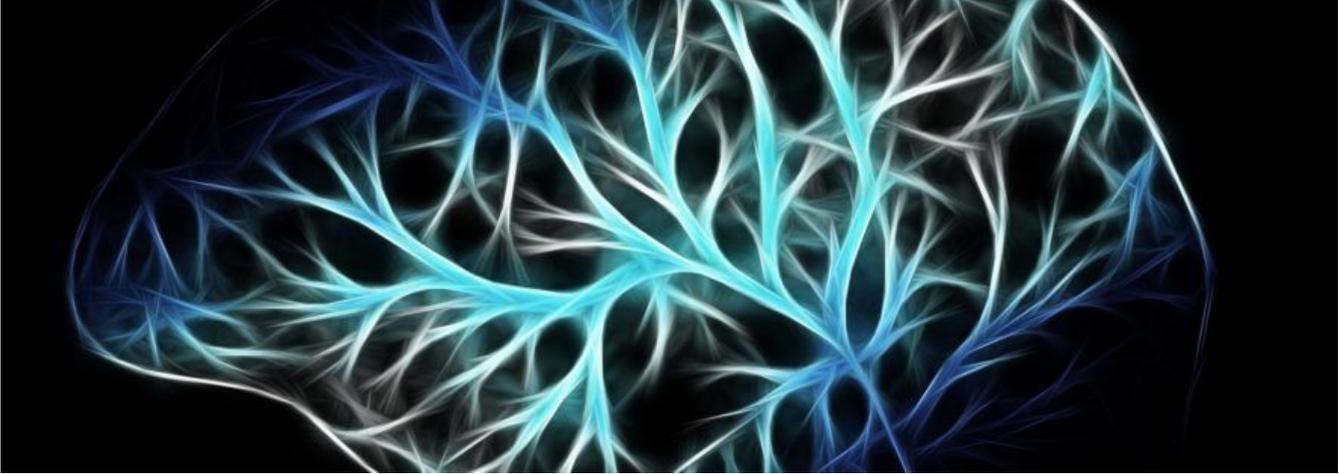


Improve Fact Retention



It can be frustrating when someone forgets their math facts. Thankfully, there are a few easy ways you can prevent this and to improve retention.

How to Improve Retention

Retention is an important part of becoming fluent in math facts. When retention occurs, facts become easier to remember. The best way to improve retention is to increase synapses strength. *Synapses* are the signals in our brains that help us to remember things. In this article, you will receive five tips on how you can increase this strength and improve retention.

Tip 1. Build onto Things Already Known

- *“In order to store new information, a stimulus can be [attached] ... to previous knowledge.” – Dr. Britney Kitamata-Wong, UC Berkeley*
- *“The initial findings ... that prior knowledge boosts comprehension ... have been corroborated” – Brod, Werkle-Bergner, and Shing*

All new knowledge is built on previous memories. When developing a new memory, it’s best if you build it on something you already know. The stronger the memory, the better.



Technique – Fact Doubling – Most people can double numbers rather easily. This makes fact doubling extremely useful for learning multiplication facts. The key is to use a multiplication fact that you already know and build onto it. For example, let’s say you know very strongly that $6 \times 2 = 12$. If this is true, then this is an excellent fact to build onto. Let’s say you want to learn 6×4 . Just double one part of the question and double the answer:

$$6 \times 2 = 12$$

$$\underline{6 \times 2 = 12}$$

$$6 \times 4 = 24$$

It works for other facts as well:

$$6 \times 3 = 18$$

$$\underline{6 \times 3 = 18}$$

$$6 \times 6 = 36$$

Tip 2. Use Chunking

- *"People with high-capacity working memory rely on "chunking," a process that groups items together." - Dr. Berit Brogaard*
- *"The key to improving one's memory is to improve processes of encoding" – McDermott and Roediger, Professors of Psychology*



Research has shown that our short term memory can only hold up to 3 pieces of information at the same time. When we want to hold more than 3 pieces of information, we use a process called chunking. Chunking allows us to hold more information in our short term memory by connecting multiple pieces of information together.

Technique – Fact Families – Fact Families is a technique that works well with chunking. Fact families relate each set of facts that go together into chunks, or families. For example, the 6×4 fact family includes $6 \times 4 = 24$, $4 \times 6 = 24$, $24 \div 6 = 4$, and $24 \div 4 = 6$. By teaching a fact family together, each of the various facts will reinforce one another, making these memories stronger.

Tip 3. Try to Combine Sensory Modes

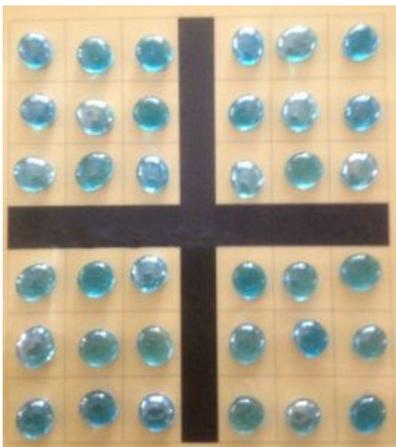
- *"Information stored using more than one "sensory mode" will be easier for you to remember and recall later." – Oregon State University*
- *"The best way to remember something is to have multiple kinds of information associated with it." – Morgridge Institute for Research*

When you learn something new, you first use your senses (such as sight, hearing, speech and touch) to gather information. Each of these use a different part of your brain. The more you combine, the more likely you are to learn.



Technique – Use Arrays and Counters – Arrays are a great tool that can combine sensory modes when teaching math facts. Teaching with arrays is easy to do, and learning is much more efficient.

When using arrays it's important to use counters. Counters allow an extra sensory mode (touch) to be used. There are plenty of items you can use as counters. Some examples are beans, pennies, and bingo chips.



When using an array, be sure to begin with a small fact (such as 3×3). Large facts (such as 3×6 or 6×6) are taught through doubling (Given in Tip 1). This can easily be done on an array by doubling sections.

A collection of arrays designed to teach these facts are provided on our [worksheets page](#). These worksheets are free to print and use.

Tip 5. Get Enough Sleep

- *“During sleep, the [brain] replays recent events [determining] what needs to be stored” – Queensland Brain Institute.*
- *Over more than a century of research has established the fact that sleep benefits the retention of memory. – Rasch and Born*

Sleep is a very important part of the learning process. While you are experiencing a deep sleep your brain is organizing all the information it has received through the day. It looks to see what information will be useful in the future, organizes it, and stores the information in your long term memory.