Mnemonic Strategies to Teach Addition, Subtraction, Multiplication and Division Facts and Math Vocabulary

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Learning Styles

Visual Learners - (65%) Seeing pictures, diagrams, and charts enhances memorization skills.

Auditory Learners - (30%) Learn best by lectures, discussions, need to repeat things aloud.

Kinesthetic Learners - (5%) Active participation, using manipulatives, drama to learn.

Understanding How Memory Works

The brain has three types of memory.

1. Sensory Memory
2. Short Term (or working memory)
3. Long Term Memory

Moving Information From Short Term to Long Term Memory

1. Meaningfulness & Familiarity - It has to make sense & be familiar.
2. Rhymes - Songs and rhymes imprint the instructional message 90% faster than any other strategy!
3. Patterns - Finding a pattern, rule or underlying principle in the material, enhances memory.
4. Associations - Using association methods is one of the best retention mechanisms that we can employ in learning. It is also a method that is not used to it's maximum potential.
5. Visualization - Studies on visualization prove that images are much more memorable than words.
6. Repetition - 5/5 Rule. Repeat the fact 5 times a day for 5 days.
7. Fun!! - If an activity is fun, it is much more likely that it will be remembered.
8. Motivation - Student needs to make a verbal commitment to memorize information.
Rhymes to Help Remember Math

The Shape Song
(Tune: Farmer in the Dell)

A circle’s like a ball,
A circle’s like a ball,
Round and round, it never stops,
A circle’s like a ball.

A square is like a box,
A square is like a box,
It has 4 sides, they are the same,
A square is like a box.

A triangle has 3 sides,
A triangle has 3 sides,
Up the mountain, down and back,
A triangle has 3 sides.

A rectangle has 4 sides,
A rectangle has 4 sides,
2 are long and 2 are short,
A rectangle has 4 sides.

A pentagon has 5 sides,
A pentagon has 5 sides,
Draw a square with an extra side,
A pentagon has 5 sides.

Visual learners need to draw the shapes and see them as they sing. Kinesthetic learners like to make the shapes with their hands.

Days of the Week
Sunday learn the Golden Rule
Monday off we go to school
Tuesday is a day to add
Wednesday we are kind of bad
Thursday teacher gives a test
Friday we will do our best
Saturday is here for play
Now you know the 7 days.

Sum
“Sum” apples are green. “Sum” apples are red. “Sum” is the answer when you add in your head

Regrouping
“Bigger Bottom, Better Borrow”

In all
How many balls in all?
We add to get the call.

Difference
Difference, difference
What can it be?
The subtraction answer
Don't you see?

Isosceles Triangle
Oh isosceles, oh isosceles
Two angles have equal degrees.
Oh isosceles, oh isosceles,
You look just like a Christmas tree.

Song for Odd (Sing to BINGO)
There was a farmer, who had a cow,
And ODD was his name-O
2, 4, 6, 8, 10
2, 4, 6, 8, 10
2, 4, 6, 8, 10
And ODD was his name-O.

Song for Even (Sing to BINGO)
There was a farmer, who had a pig,
And EVEN was his name-O
2, 4, 6, 8, 10
2, 4, 6, 8, 10
2, 4, 6, 8, 10
And EVEN was his name-O.
### Coin Rhyme

Penny, penny,  
Easily spent,  
Copper brown  
And worth one cent.

Nickel, nickel,  
Thick and fat,  
You're worth five cents,  
I know that.

Dime, dime  
Little and thin,  
I remember,  
You're worth ten.

Quarter, quarter,  
Big and bold,  
Worth twenty-five  
I am told.

### Months in Order

January, February,  
March and April too,  
The first four months  
Bring happiness to you.

May and June,  
July and August  
Lots of fun  
When summer's hottest.

September, October,  
The leaves are falling.  
November, December,  
Holidays are calling.

These 12 months  
Are easy to remember,  
52 weeks from  
Jan. to December.

### Patterns for Memorization

The brain records information in images and patterns. It's like a filing cabinet with intricate organization skills. Repeating patterns are easy to store and recall.

#### Counting by Five: Use a “sing-song” voice and clap to the syllables.

- **Five, ten**  
  (2) slow claps

- **Fifteen, twenty**  
  (4) even claps

- **Twenty-five, thirty**  
  (3) fast, (2 even claps)

- **Thirty-five, forty**  
  (3) fast, (2 even claps)

- **Forty-five, fifty**  
  (3) fast, (2 even claps)

- ** Fifty-five, sixty**  
  (3) fast, (2 even claps)

- **Sixty-five, seventy**  
  (3) fast, (2 even claps)

- **Seventy-five, eighty**  
  (3) fast, (2 even claps)

- **Eighty-five, ninety**  
  (3) fast, (2 even claps)

- **Ninety-five, one hundred!**  
  (3) fast, (3 even claps)
Associations Make Connections in the Brain

Acronyms - a silly saying using the first letter of the word or list to be memorized.
Remembering the sequencing of the metric system:
- My Cat Drank Milky Ketchup
  - The M in My is for millimeter.
  - The C in Cat is for centimeter
  - The D in Drank is for decimeter
  - The M in Milky is for meter
  - The K in Ketchup is for kilometer

Roman Numerals in Order:
- I Value Xylophones Like Cows Drink Milk
  - I = 1
  - V = 5
  - X = 10
  - L = 50
  - C = 100
  - D = 500
  - M = 1000

Remembering the Procedural Order of Operations in Algebra
- Please Excuse My Dear Aunt Sally
  - Parentheses Exponents Multiply Divide Add Subtract

Remembering the Procedural Order of Operations of Long Division
- Dad = Divide
- Mother = Multiply
- Sister = Subtract
- Brother = Bring Down
- Rover (the dog) = Remainder

Stories - Stories are easier to remember than random information. Good books to use for remembering measurement are the Scholastic Series, Sir Cumference. There are about 10 different books for math in this series.

King Inch in the Kingdom of Measure
(Located in the back of the hand-out)
Read the story aloud and discuss the different measurement tools mentioned. Students can draw pictures illustrating the parts of the story and make a book from their pages. Stories suggest visual pictures and help students remember the measurement terms.
Visualization
A picture is worth a thousand words. Visual learners memorize and store information with images.

To remember the term and meaning for rhombus, draw a parallelogram with all sides congruent and push it over. It becomes a rhombus. Draw a picture and make an association between the word and the meaning.

How to Remember Liquid Measurement (Using a visual and story)

The Kingdom of Gallon
Once upon a time, long, long ago, there was a kingdom called The Kingdom of Gallon. (Students draw a big G on their paper, filling the entire page. Explain the G represents Gallon)

In the Kingdom of Gallon there lived four Queens. They were sisters and all looked exactly alike. (Draw 4 big Q’s and explain the Q also represents Quart.)

I hate to tell you this, but soon the four queens got into a huge fight and couldn’t agree on how to rule over the Kingdom of Gallon. Finally they decided to split the kingdom in half. Two queens ruled a Half Gallon in the north, and the other two queens ruled the Half Gallon Kingdom in the south. (Look for the dividing line on the G for each kingdom.)

Now that there was peace in the kingdoms, the queens got married and each one had a Prince and a Princess. (With what letter does Prince and Princess begin? The P stands for Pint. Draw two letter P’s inside each Q.)

There is something I forgot to tell you. Each Prince had two cats and each Princess had two cats. (The C for cats reminds us of C for Cups. Draw two C’s inside each P.)

Ask random questions about how many quarts in a gallon, how many pints in a quart etc. to make sure students are able to visualize the picture to find the answer.)
Rounding Numbers Visually

Draw a long line of hills on the whiteboard. If you are rounding to the nearest 10, begin at the left and write 0 on the bottom of the first hill, making number designations up to 5 at the top of the hill. Continue with each hill. All of the ten endings should be in the valley and the 5 endings on top of each hill.

Obtain a picture of a car and attach a magnet to the back. Place the car at number 14 and talk about getting out to look at the view and forgetting to set the brake. Which way would the car roll? (Down to the 10.)

Place the car at the top of the hill. Which way would the car roll? Since the engine is in the front and is heavier, it would roll down the hill to number 20. (Have students try putting it at different locations to see which number it would round to. Visual learners benefit from this picture of rounding. Now it makes sense to them.)
More Visual Math Vocabulary

horizontal parallel

radius short diameter long

Remember this, and you’ll never get it wrong!

Repetition and Fun
If an activity is fun it becomes easy to repeat. Repetition helps place information in long-term memory but it needs to be fun or students will tune out.
Try this activity for fun!

Counting by TEN
Ten, twenty Touch each foot
Thirty, forty Touch each knee
Fifty, sixty Touch each hip
Seventy, eighty Touch each shoulder
Ninety, one-hundred Touch each ear and put hands in air

Memorizing Addition and Subtraction Facts
What is the Memory Joggers method?
1. Uses rhymes that are easy to memorize and fun to say aloud.
2. Clapping patterns help kinesthetic learners take an active part. By having fun, memorization occurs easily.
3. Cute pictures help visual learners make a connection.
4. Repetition is fun, not boring!
5. Instead of memorizing 144 singular addition and subtraction facts, the fact family concept narrows it down to 36.

Steps to Successful Mastery of Addition and Subtraction
Teach counting by two with rhymes, odd and even.

Even Rhyme
2, 4, 6, 8
Who do we appreciate?
10, 12, 14 too
Even numbers just for you.
16, 18, 20, yes!
How many more? Take a guess!
Odd Rhyme
1, 3, 5, 7, 9
Odd little numbers all in a line.
11, 13, 15 too
Marching along to the zoo.
17, 19 running late,
Barely make it to the gate!

Practice until students can add and subtract by one and by two and become very proficient. The remaining 28 fact families can be memorized using clapping rhymes.

Addition & Subtraction - Memory Joggers Method
By repeating rhymes while clapping out patterns, students remember the connection of the three numbers in the fact family. Students are memorizing addition and subtraction facts by repetition, pictures and the successful memory method of using rhymes. Teach all 36 facts from 2 + 2 through 9 + 9.

Adding/Subtracting Rhymes
6 plus 7 is 13 6 plus 8 is 14
Playing on a soccer team Teacher says “Good Morning”
13 minus 7 is 6 14 minus 6 is 8
I got hit like a ton of bricks! Say the pledge, stand up straight

3 + 5 is 8
Blackbirds on a gate
8 minus 5 is 3
Off they flew to a tree.

Use graph paper and stamp markers for teaching the concept so students will visualize the fact family.

Why it works!
• “Fact family” idea of teaching adding and subtracting as a group or family.
• It is verbal, out-loud repetition of the facts in rhyme. CD helps auditory learners memorize.
• Uses the tactile senses with clapping patterns.
• Rhymes are powerful tools for all learners. especially auditory learners.
• Pictures aid the visual learner. Activity books reinforce the facts and have pictures to color.
• It is fun and children want to repeat the facts many times.

How to use the system
• First Grade - 2 rhymes per week.
• Older grades, teach only the more difficult facts. Learn 3-4 per week.
• Repeat the rhymes 5 times a day for 5 days. Review the rhymes throughout the year.
• Encourage the children to make it a game for recess with multiple clapping patterns.
• Use the rhymes for jump rope.
• Write the rhyme, color the picture and write the fact family. Make a book for each child.
• Listen to the audio CD at a listening center.

Multiplication & Division

Learning The Concept
Learn the concept of multiplication and division first!. This is the Meaningfulness and Familiarity part of memorization. Have students fill out the “Finding Groups” worksheet to promote the idea of multiplication.

By looking for groups of things, students begin to understand that multiplication is a quicker way to add. Keeping math journals help students look and comment about groupings. There are many kinds of manipulatives that make multiplication and division more understandable. Teach multiplication and division together as a fact family.

The Memory Joggers method of memorizing all those hard to remember fact families, uses a memory association tool called the "Peg System". The system also uses rhymes and visual pictures.

Memorizing Using the Memory Joggers Method
Teach students to remember the following associations.

0..............mouth 0 eats every other number.
1.............. gum 1 sticks to the other number
2.............. shoe Shoes come in pairs, count by twos
3.............. tree Three rhymes with tree.
4............. door Four sounds like door.
Learn 5’s from clock
Six sounds like sticks.
Seven is a boy named Kevin.
Eight is a snowman named Nate.
Nina (pronounced Nine-uh) is a porcupine shaped like a nine.

How to make all of those hard facts EASY!
It is easy to remember stories with pictures. By adding familiar associations with the numbers, the multiplication and division facts are quick and fun to learn. The amazing part of this system, is that it teaches not only the multiplication fact but division as well and at the same time.

\[ 7 \times 9 = 63 \]
Kevin (7) and Nina the Porcupine (9) went for a long walk. They were looking for a tree that was just right for climbing. Soon they came upon a perfect tree. Kevin (7) and Nina (9) started climbing fast. But the tree had sap on it and they got stuck! It was a “sticky tree” which rhymes with 63.

\[ 8 \times 7 = 56 \]
Nate (8) and Kevin (7) decided to enter a talent show contest to win the first prize of $56. Nate and Kevin came up with a song and dance that goes like this:

Flippy kicks, flippy kicks,
8 times 7 is 56

The product of 56 rhymes with “flippy kicks.”

\[ 3 \times 4 = 12 \]
Deep in the forest there is a magic tree (3) with a cute little door (4) in the trunk. If you open the door very quietly and climb the ladder inside, you will find 12 little green elves hiding in the leaves of the tree. Remember, 12 rhymes with elves.

Memorizing the 10, 11 and 12’s
Tens are easy to teach. Just add a zero to the number being multiplied.
\[ 10 \times 5 = \text{Take the } 5 \text{ and add a zero } = 50 \]

Multiplying by eleven for all numbers 1 – 9 is simple - double the digit being multiplied by 11.
\[ 11 \times 3 = \text{Take the } 3 \text{ and place another } 3 \text{ after it } = 33 \]

By using the peg word “Telf the elf” for 12, plus the other number characters, the facts are recalled by association. Example:

\[ 12 \times 9 = 108 \]
Nina, Nina, never late,
Loved to sing and roller skate,
Even across the Golden Gate.
Telf was lazy and always late,
  Couldn't skate at any rate.
Nina and Telf made a date
To meet at the bridge at 1:08.
Guess you know who had to wait,
  Telf never made it by 1:08.
  Nina couldn't tolerate
  Telf's bad habit of being late.

The Process
Visualize the Story - After showing the picture and telling the story, children close their eyes and see the picture in their imagination. They draw it in mid air. Ask questions to reinforce the number and symbol connection.

Activity Book - Children rewrite the story in their own words, color the picture and write the fact family to reinforce learning. Use the Activity Book provided or make your own pages and assemble into a book for each student.

Acting out Stories - Children learn best when they use kinetic or whole body activity. After the story is told, 3 children are picked to act it out. Each child wears a number and tells the story with help from the teacher.

Graph Paper & Stamp Markers - Stamp the fact family and write the facts to visualize the family.

Repeat Stories Frequently - Within 24 hours, repeat the story. Tell no more than 2 stories a day. Always review the stories the next day, asking the children to tell the story aloud.

Centers - Students test each other, using the picture cards and telling the stories to each other. Teachers can also display the pictures around the room.

How to Teach Using the Memory Joggers System
Monday Read two stories, visualize and answer questions. Write out story in individual activity book.
Tuesday Students retell the story and act it out.
Wednesday Read two more stories, visualize and answer questions. Write out story in activity book. Review previously learned stories.
Thursday Students retell all previously learned stories and act out Wednesday's stories.
Friday Review stories and test students, using multiplication and division questions. Remind them of the digit associations (8 = Nate) and sound alike answers. (63 = sticky tree).
Results
Teachers, resource specialists, tutors and parents nationwide are using this method of teaching multiplication and division. It is highly successful for ADHD, Dyslexic, Autistic children and even those with Down Syndrome. Due to the visual pictures, associations and rhymes, all children find they are able to master this technique quickly, have fun in the process and succeed in math.

Purdue University professors, Scruggs and Mastropieri, evaluated the results of mnemonic instruction in learning disabilities intervention and concluded: “Mnemonic instruction delivers the greatest learning increases seen in the history of learning disabilities intervention research.”

“Memory is the mother of all wisdom.”
Aeschylus, 490 B.C.

Do your children a favor.
Teach them how to carry math fact answers, not on their fingers, but in their heads.

Memory Joggers
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Email: donnalyn@memoryjoggers.com
Secure Website: http://memoryjoggers.com
GROUP OF THINGS

NUMER OF THINGS

REPORTER - Shares the information with the class
RECORDE - Writes information on chart
COUNTER - Counts how many things in the group
HUNTER - Finds the group of things

Decide on who will be:

FINDING GROUPS OR ARRAYS
<table>
<thead>
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<th>Days of Week</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Soda cans</td>
<td></td>
</tr>
<tr>
<td>Toes on foot</td>
<td></td>
</tr>
<tr>
<td>Legs on chair</td>
<td></td>
</tr>
<tr>
<td>Tennis balls</td>
<td></td>
</tr>
<tr>
<td>Chopsticks</td>
<td></td>
</tr>
<tr>
<td>Group 1</td>
<td>1</td>
</tr>
<tr>
<td>Group 2</td>
<td>2</td>
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<td>Group 3</td>
<td>3</td>
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<td>Group 4</td>
<td>4</td>
</tr>
<tr>
<td>Group 5</td>
<td>5</td>
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</tbody>
</table>
Learning Inch, Foot, Yard and Mile

Stories suggest visual pictures and help children understand terms. In the following story called King Inch in the Kingdom of Measure by Donnalyn Yates, children visualize and easily remember the names of customary lengths such as inches, feet, yards and miles. It’s fun to read the story aloud while the students illustrate with pictures, labeling the measurement devices. The pictures can later be made into a book. This activity helps children learn to visualize

King Inch in the Kingdom of Measure

Long, long ago in the kingdom of Measure, there was a ruler named King Inch. He loved to measure things like the length of his pet dragon or his own big nose or the queen’s fingernails. There was only one problem, nothing had been invented to measure with, so he used the tip of his little finger. He would say, “my nose is 3 little finger tips long.” He found out his pet dragon was 394 little finger tips long. And on and on he went, measuring everything in sight!

King Inch got tired of saying how many “little finger tips long” everything was. The Queen suggested he name the length after himself. That way people would always think of him. Call the number an “inch.” So from that day on, this length was known as an inch.

One day King Inch wanted to measure his bedroom. He was down on his hands and knees trying to measure with his little finger tip. He gave up and sat down on his bed thinking there must be a better way. Looking at his bare foot gave him an idea! He measured his foot and it was 12 inches long! Now he could walk around and measure things much more easily. He measured his bedroom and it was 16 feet long and 14 feet wide. The king was having such a good time using his feet for measuring.

But sometimes it was hard to measure something tall like a column, with his feet held up in the air. So he had his carpenter make a stick the length of his foot and his scribes drew 12 inch lines on it. He made a proclamation that 12 inches would always equal 1 foot and since he was the king, it would be called a “ruler.” Everyone in his kingdom was excited and began to measure things using their rulers!

One fine day as King Inch was out measuring the castle wall with his little 12 inch ruler, he realized he needed something even longer. He noticed a workman building something with a long stick. Since King Inch was wild about measuring things, he used his little ruler and found out the stick was exactly 3 feet long! He grabbed the stick away from the worker and said, “This will make my measuring much easier and faster!”

The workman replied, “But good King Inch, I’m building a yard for your dog and I need that stick.” The king angrily replied, “Oh, get another yard stick.” And off he went using the yard stick to measure the wall. Soon he began to wonder about something.

“I wonder how many inches are in this yard stick?” said the king aloud. He remembered that the yard stick was exactly 3 feet long. But how many inches would that be? Let’s see, 12 inches plus 12 inches plus 12 inches. Or I could multiply 12 x 3.

\[
\begin{array}{c c c c c c}
12 & 12 & 12 \\
12 & x & 3 \\
+12 & & & 36 \\
36 & & & & & \\
\end{array}
\]

“Ah, a yard stick is 36 inches long or 3 feet long!” exclaimed the king.

King Inch continued to measure. He discovered the wall was 20 yards long. The King wondered how many feet that would equal. He knew his yard stick was 3 feet long so he multiplied 20 yards times 3 feet and it equaled 60 feet.
One day, King Inch was invited to Queen Mile's castle. Since he was obsessed with measuring, he ordered a young boy from his kingdom to take the yard stick and start measuring the road from his castle to Queen Mile's castle. As the king rode along comfortably in the horse-drawn coach, the boy was counting how many times he placed the yard stick along the road. He was getting very, very tired but finally they arrived.

The boy stood tall and said "Oh good King Inch, the road to the Queen's castle is 1,760 yards." The king replied, "No, I want to know how many feet it is to her castle!"

Quickly the boy multiplied 1,760 X 3 feet and told the king it was 5,280 feet.

The king was thrilled! He made a proclamation. "From this day forward, 5,280 feet will be called a "mile" since that is how far it is to Queen Mile's castle."

King Inch became known throughout the world. Nothing ever changed. The ruler was always 12 inches long and that measurement was called a foot. The yardstick remained 3 feet long or 36 inches, and the mile equaled 5,280 feet. The Kingdom of Measure will never be forgotten.

King Inch made up this little rhyme to help all of his subjects remember the length of a mile.

Five thousand two hundred and eighty,
The distance to a lovely queen lady,
Her name was Queen Mile
She had a nice smile
Five thousand two hundred and eighty.