Teaching Math to Children with Special Needs

Joan A. Cotter, Ph.D.
JoanCotter@RightStartMath.com

Sioux Empire Christian Home Educators
Homeschool Conference
Sioux Falls, SD
Saturday, May 2, 2015
3:00 p.m.– 4:00 p.m.
Myths about LD

- People with LD have lower intelligence. (33% are gifted.)
- They are lazy or stubborn.
- Children with LD can be cured or will outgrow it.
- Boys are more likely to be affected. (Girls are equally affected.)
- Dyslexia and learning disability are the same thing.
- Students with LD and ADHD cannot succeed in higher education.
Characteristics of LD

Child usually:

• Is more creative.

• Cannot learn by rote.

• Must understand and make sense of a concept in order to remember it.

• Is more visual and hands-on.

• Dislikes worksheets.

• Finds it very difficult to unlearn.
Problems Occurring with Math

Dyscalculia

- Reversals in writing numbers
- Poor number sense
- Slow fact retrieval
- Errors in computation
- Difficulty in solving word problems

Dyscalculia mainly affects arithmetic, not other branches of math.
How Math is Traditionally Taught

• Counting
  • Learn sequence (number names by heart)
  • One-to-one correspondence (one count per object)
  • Cardinality principle (last number tells how many)

• Memorizing facts
  • Flash cards and timed tests
  • Rhymes and songs

• Memorizing algorithms (procedures)

• Using key words to solve story problems
Traditional Counting
From a child’s perspective

Because we’re so familiar with 1, 2, 3, we’ll use letters of the alphabet.

A = 1
B = 2
C = 3
D = 4
E = 5, and so forth
Traditional Counting
From a child’s perspective

F + E =

What is the sum?
Traditional Counting
From a child’s perspective

F + E = K

A B C D E F G H I J K
Traditional Counting
From a child’s perspective

Now memorize the facts!!

E + H
D + C
G + D
H + F
F + E
Traditional Counting
From a child’s perspective

H – C =

Try subtracting by “taking away.”
Traditional Counting
From a child’s perspective

Try skip counting by B’s to T:
B, D, . . . , T.

What is D × E?
Compared to Reading

Just as reciting the alphabet doesn’t teach reading, counting doesn’t teach arithmetic.
Counting-Based Arithmetic

• Rote counting to 100 in kindergarten.
• Calendars misused to teach counting.
• Counting on for addition. (Jack and Jill)
• Counting back for subtraction.
• Number lines are abstract counting.
• Skip counting for multiplication facts.
• Does not work well for money or fractions or reading graphs.
Memorizing Math

<table>
<thead>
<tr>
<th>Percentage Recall</th>
<th>Immediately</th>
<th>After 1 day</th>
<th>After 4 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rote</td>
<td>32</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>Concept</td>
<td>69</td>
<td>69</td>
<td>58</td>
</tr>
</tbody>
</table>

Math needs to be taught so 95% is understood and only 5% memorized.

—Richard Skemp
Memorizing Math

According to a study with college students, it took them:

• 93 minutes to learn 200 nonsense syllables.
• 24 minutes to learn 200 words of text.
• 10 minutes to learn 200 words of poetry.
Flash Cards and Timed Tests

• Often used to teach rote.
• Liked only by those who don’t need them.
• Give the false impression that math does not require thinking.
• Often produce stress – children under stress stop learning.
• Not concrete – use abstract symbols.
• Cause stress (may become physically ill).
• Result in short-term learning.
• May lead to math anxiety.
Visualizing

A pilot study of the effects of RightStart instruction on early numeracy skills of children with specific language impairment

Riikka Mononen, Pirjo Aunio, Tuire Koponen

Abstract:

....The children with SLI [specific language impairment] began kindergarten with significantly weaker early numeracy skills compared to their peers. Immediately after the instruction phase, there was no significant difference between the groups in counting skills....
Visualizing

• *Visual* is related to seeing.

• *Visualize* is to form a mental image.
Visualizing

Visualizing is also needed in other fields:

- Reading
- Sports
- Arts
- Geography
- Engineering
- Construction
- Biology
- Architecture
- Astronomy
- Archeology
- Chemistry
- Physics
- Surgery
- History
Try to visualize 8 identical apples without grouping.
Visualizing

Now try to visualize 8 apples: 5 red and 3 green.
Grouping in Fives
Early Roman numerals

1 1
2 II
3 III
4 IIII
5 V
8 VIII
Grouping in Fives
Musical staff
Grouping in Fives
Clocks and nickels
Grouping in Fives

Tally marks

N  N  I  I  I
Grouping in Fives

Subitizing

• Instant recognition of quantity is called *subitizing*.

• Grouping in fives extends subitizing beyond five.
Subitizing

• Five-month-old infants can subitize to 1–3.
• Three-year-olds can subitize to 1–5.
• Four-year-olds can subitize 1–10 by grouping with five.
Research on Subitizing
Karen Wynn’s research
Research on Subitizing
Karen Wynn’s research
Research on Subitizing
Karen Wynn’s research
Research on Subitizing
Karen Wynn’s research
Research on Subitizing
Karen Wynn’s research

You could say subitizing is much more “natural” than counting.
Research on Subitizing
In Japanese schools

• Children are discouraged from using counting for adding.

• They consistently group in fives.
Quantities 1–10
Using fingers
Quantities 1–10
Subitizing five
Quantities 1–10

Subitizing five

5 has a middle; 4 does not.
Quantities 1–10

Tally sticks

Five as a group.
Quantities 1–10
Tally sticks
# Quantities 1–10

Number chart for remembering numerals

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>6</td>
<td></td>
<td>7</td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>7</td>
<td>8</td>
<td></td>
<td>9</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quantities 1–10
Entering quantities

3
Quantities 1–10

Entering quantities

7
Quantities 1–10

Stairs
Quantities 1–10

Adding
Quantities 1–10
Adding

4 + 3 = __
Quantities 1–10
Adding

4 + 3 = 7

Japanese children learn to do this mentally.
Games

Games
-----
Math

= Book
-----
Reading

• Games provide interesting repetition needed for automatic responses in a social setting.

• Games provide an application for new information.

• Games provide instant feedback.
Games
Go to the Dump

Objective: To learn the facts that total 10:

1 + 9
2 + 8
3 + 7
4 + 6
5 + 5

It is played similar to Go Fish.
Place Value

The problem

- English-speaking children often think of 14 as 14 ones, not 10 and 4 ones.
- The pattern that is needed to make sense of tens and ones is hidden!
Place Value

Its importance

• Place value is the foundation of modern arithmetic.

• It is critical for understanding algorithms.

• It must be taught, not left for discovery.

• Children need the big picture, not tiny snapshots.
Transparent Number Naming

11 = ten 1 20 = 2-ten
12 = ten 2 21 = 2-ten 1
13 = ten 3 22 = 2-ten 2
14 = ten 4 23 = 2-ten 3
19 = ten 9 . . .
99 = 9-ten 9
Transparent Number Naming

137 = 1 hundred 3-ten 7

or

137 = 1 hundred and 3-ten 7
Math Way of Number Naming

• Only 11 words are needed to count to 100 the math way, 28 in English. (All Indo-European languages are non-standard in number naming.)

• Asian children learn mathematics using transparent number naming.

• Mathematics is the science of patterns. Number names need to be an example.

• Children who are hearing-impaired can distinguish between 14 and 40, and 13 and 30.

• Learning two languages helps brain development.
Compared to Reading

Just as we first teach the *sound* of the letters, we must first teach the *name* of the quantity, the math way.
Math Way of Number Naming

Regular names

4-ten = forty

The “ty” means tens.
Math Way of Number Naming

Regular names

6-ten = sixty

The "ty" means tens.
Math Way of Number Naming

Regular names

3-ten = thirty

“Thir” also used in 1/3, 13 and 30.
Math Way of Number Naming
Regular names

2-ten = twenty

Two used to be pronounced “twoo.”
Math Way of Number Naming
Regular names

A word game

fireplace → place-fire
newspaper → paper-news
box-mail → mailbox
Math Way of Number Naming

Regular names

Suffix -teen means ten.

ten 4 → teen 4 → fourteen
Math Way of Number Naming
Regular names

a one left → a left-one → eleven
Math Way of Number Naming

Regular names

two left → twelve

Two said as “twoo.”
Composing Numbers

3-ten

3 0
Composing Numbers

3-ten 7

3 0

7
Composing Numbers

3-ten 7

Note the congruence in how we say the number, represent the number, and write the number.
Composing Numbers

1-ten 8

1 0

8
Composing Numbers

1-ten 8

1 8
Composing Numbers

10-ten

1 0 0
Place-Value Cards

3 0
3-ten

3 0 0
3 hun-dred

3 0 0 0
3 th-ou-sand
Place-Value Cards

4 0 0 0
2 0 0
5 0
7

4 0 0 0
2 0 0
5 0
7

4 2 5 7
Place-Value Cards

3 0 0 0 8

3 0 0 0 8

3 0 0 8
**Place Value**

Two aspects

**Static (Recording)**

- Value of a digit is determined by position.
- No position may have more than nine.
- As you progress to the left, value at each position is ten times greater than previous position.
- Represented by the place-value cards.

**Dynamic (Trading)**

- 10 ones = 1 ten;
  10 tens = 1 hundred;
  10 hundreds = 1 thousand, ….
- Represented with abacus and other materials.
Learning the Facts

Limited success, especially for struggling children, when learning is:

• Based on counting: whether dots, fingers, number lines, or counting words.

• Based on rote memory: whether flash cards, timed tests, or computer games.

• Based on skip counting: whether fingers or songs.

A child is considered to know a fact if they can give it in 2–3 seconds.
Fact Strategies
Complete the Ten

9 + 5 = ___

Take 1 from the 5 and give it to the 9.
Fact Strategies
Complete the Ten

9 + 5 = ___

Take 1 from the 5 and give it to the 9.
Fact Strategies
Complete the Ten

9 + 5 = 14

Take 1 from the 5 and give it to the 9.
Fact Strategies

Two Fives

8 + 6 =
Fact Strategies
Two Fives

8 + 6 =
10 + 4 = 14

The two fives make 10.
Fact Strategies
Missing Addend

9 + __ = 15

Start with 9; go up to 15.
Fact Strategies

Missing Addend

9 + _6_ = 15

Start with 9;
go up to 15.
Fact Strategies
Subtracting Part from Ten

15 \(-\) 9 = __

Subtract 5 from 5 and 4 from 10.
Fact Strategies
Subtracting Part from Ten

$15 - 9 = 6$

Subtract 5 from 5 and 4 from 10.
Fact Strategies
Subtracting All from Ten

15 – 9 = __

Subtract 9 from 10.
Fact Strategies
Subtracting All from Ten

15 – 9 = __6__

Subtract 9 from 10.
Money
Penny
Money
Nickel
Money
Dime
Money
Quarter
Four quarters.
Part-Whole Circles

whole

part  part
Part-Whole Circles

What is the whole?

2
5
Part-Whole Circles

What is the other part?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?

Is 3 the whole or a part?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?

Is 5 the whole or a part?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?

What is the missing part?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?

What is the missing part?
Part-Whole Circles
Missing addend problem

Lee received 3 goldfish as a gift. Now Lee has 5. How many goldfish did Lee have to start with?

Write the equation.

2 + 3 = 5
3 + 2 = 5
5 − 3 = 2
Part-Whole Circles

• Research shows part-whole circles help young children solve problems. Writing equations do not.

• Do not teach “key” words. The child needs to focus on the situation, not look for specific words.
Multiplication Strategies
Basic facts

$6 \times 4 = 24$

(6 taken 4 times.)
Multiplication Strategies
Basic facts

9 × 3 =
Multiplication Strategies

Basic facts

$9 \times 3 = 30 - 3 = 27$
7 \times 7 =
Multiplication Strategies
Basic facts

$7 \times 7 =$
$25 + 10 + 10 + 4 = 49$
Multiplication Strategies
Commutative property

5 × 6 = 6 × 5
## Multiplication Strategies
### Multiplication table

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>12</td>
<td>18</td>
<td>24</td>
<td>30</td>
<td>36</td>
<td>42</td>
<td>48</td>
<td>54</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>14</td>
<td>21</td>
<td>28</td>
<td>35</td>
<td>42</td>
<td>49</td>
<td>56</td>
<td>63</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>32</td>
<td>40</td>
<td>48</td>
<td>56</td>
<td>64</td>
<td>72</td>
<td>80</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>18</td>
<td>27</td>
<td>36</td>
<td>45</td>
<td>54</td>
<td>63</td>
<td>72</td>
<td>81</td>
<td>90</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>
Trading
Simple adding

\[ 8 + 6 \]
Trading
Simple adding

\[
\begin{array}{c}
8 \\
+ 6 \\
\hline
14
\end{array}
\]
Trading
Simple adding

8
+ 6
14

Too many ones; trade 10 ones for 1 ten.
Trading
Simple adding

\[
\begin{align*}
8 + 6 &= 14 \\
\text{Same answer before and after trading.}
\end{align*}
\]
Trading
Adding 4-digit numbers

Enter numbers from left to right.

3658
+ 2738
Trading
Adding 4-digit numbers

Enter numbers from left to right.

3658
+ 2738
Trading
Adding 4-digit numbers

Enter numbers from left to right.

3658
+ 2738
Trading
Adding 4-digit numbers

Enter numbers from left to right.

3658
+ 2738
Trading
Adding 4-digit numbers

3658
+ 2738

Enter numbers from left to right.
Trading
Adding 4-digit numbers

Add starting at the right. Write results after each step.

3658
+ 2738
Trading
Adding 4-digit numbers

3658
+ 2738

Trade 10 ones for 1 ten.
Trading
Adding 4-digit numbers

\[
\begin{array}{c}
3658 \\
+ 2738 \\
\hline
6
\end{array}
\]

Write 6.
Trading
Adding 4-digit numbers

\[
\begin{array}{c}
3658 \\
+ 2738 \\
\hline
6
\end{array}
\]

Write 1 for the extra 10.
Trading
Adding 4-digit numbers

Add the tens.

3658
+ 2738
6
Trading
Adding 4-digit numbers

Write the tens.

\[
\begin{array}{c}
3658 \\
+ 2738 \\
\hline
96
\end{array}
\]
Trading
Adding 4-digit numbers

Add the hundreds.

\[
\begin{align*}
1 & \ \ \ 3658 \\
+ & \ \ \ 2738 \\
\hline
& \ \ \ 96
\end{align*}
\]
Trading
Adding 4-digit numbers

3658
+ 2738
96

Trade 10 hundreds for 1 thousand.
Trading
Adding 4-digit numbers

Write the hundreds.
Trading
Adding 4-digit numbers

1 1
3658
+ 2738
396

Write 1 for the extra thousand.
Trading
Adding 4-digit numbers

Add the thousands.

1 1

3658

+ 2738

396
Trading
Adding 4-digit numbers

\[
\begin{align*}
3658 + 2738 &= 6396 \\
\text{Write the thousands.}
\end{align*}
\]
Trading
Adding 4-digit numbers

\[
\begin{array}{c}
3658 \\
+ 2738 \\
\hline
6396
\end{array}
\]
Short Division

• Means we don’t write the stuff underneath.
• Should always be used for single-digit divisors.
• Is easier to understand than long division.
• Needs to be taught before long division.
• Is much more useful in real life.
• Is much quicker to perform for tests.
Short Division

\[ 3) \overline{471} \]
Short Division

\[ 3 \overline{)471} \]

The little lines help keep track of place value.
400 ÷ 3 = ? [100] Write the 1 on the line.
What is the remainder? [100]
How many tens is that? [10]
How many total tens do we have? [10 + 7 = 17]
Short Division

\[
\begin{array}{c}
1 \\
3 \overline{)471}
\end{array}
\]

Show the 17 tens by writing a 1 before the 7.
Short Division

\[
\begin{array}{c}
1 \\
3 \overline{)471}
\end{array}
\]

Divide the tens: \(17 \text{ tens} \div 3 = ? \) [5 tens]
Short Division

\[ \frac{15}{3} \overline{)471} \]

To find the remainder go up: \(3 \times 5 = 15\).
How far is 15 from 17? [2]
How many ones do we have? [20 + 1 = 21]
Short Division

\[ \begin{array}{c|c}
4721 & 15 \\
3 ) & \\
\end{array} \]

To find the remainder go up: \(3 \times 5 = 15\).
How far is 15 from 17? [2]
How many ones do we have? [20 + 1 = 21]
Short Division

\[
\begin{array}{c}
\phantom{0}1 \underline{5} \\
\overbrace{3}^{1}\underline{7^{21}}
\end{array}
\]

Divide the ones: \(21 \div 3 = ?\) [7]
Divide the ones: $21 \div 3 = ?$ [7]
Write 7 ones.
Short Division

\[
\begin{array}{c}
1 \ 5 \ 7 \\
\hline
3 \overline{)4721}
\end{array}
\]
Long Division

• Children with learning disabilities should not be expected to learn long division. It can take months to learn it — an unwise use of time.

• It is a mostly memorizing a number of steps with little understanding.

• It is not a skill needed in advanced math. Dividing polynomials does not entail guessing a trial divisor.

• Rarely performed on the job or in everyday life. What is important is estimating an answer and knowing what to do with any remainders.
Fractions in the Comics

Now say we cut an apple in half...

We have two halves, don't we? Now...

That's fractions!! You're trying to teach me fractions!

You know I'll never understand fractions! What are you trying to do to me? I'll go crazy! I'll...
Fractions in the Comics

WHASSAT, MICHAEL?
FRACTIONS. I'M LEARNIN' FRACTIONS.

THIS IS A PIE, SEE... AN' IT'S CUT INTO DIFFERENT-SIZED PIECES.

NOW... IF THIS IS ONE-SIXTH OF THE PIE, AN' THIS IS ONE-FOURTH—WHAT DO WE CALL THE BIGGEST PIECE OF PIE?

DADDY'S!!

© Joan A. Cotter, Ph.D., 2015
Meaning of a Fraction

- One or more equal parts of a whole.
- One or more equal parts of a set.
- Division of two whole numbers.
- Location on a number line.
- Ratio of two numbers.
Meaning of a Fraction

Which meanings are most mathematical?

• One or more equal parts of a whole.
• One or more equal parts of a set.
• Division of two whole numbers.
• Location on a number line.
• Ratio of two numbers.
Meaning of a Fraction

Which meanings are used in everyday life?

• One or more equal parts of a whole.
• One or more equal parts of a set.
• Division of two whole numbers.
• Location on a number line.
• Ratio of two numbers.
Meaning of a Fraction

Which meaning is used in elementary texts?

• One or more equal parts of a whole.
• One or more equal parts of a set.
• Division of two whole numbers.
• Location on a number line.
• Ratio of two numbers.
# Fraction Chart

<table>
<thead>
<tr>
<th></th>
<th>( \frac{1}{2} )</th>
<th>( \frac{1}{2} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1}{2} )</td>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{3} )</td>
</tr>
<tr>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{3} )</td>
<td>( \frac{1}{3} )</td>
</tr>
<tr>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{4} )</td>
<td>( \frac{1}{4} )</td>
</tr>
<tr>
<td>( \frac{1}{5} )</td>
<td>( \frac{1}{5} )</td>
<td>( \frac{1}{5} )</td>
</tr>
<tr>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{6} )</td>
</tr>
<tr>
<td>( \frac{1}{7} )</td>
<td>( \frac{1}{7} )</td>
<td>( \frac{1}{7} )</td>
</tr>
<tr>
<td>( \frac{1}{8} )</td>
<td>( \frac{1}{8} )</td>
<td>( \frac{1}{8} )</td>
</tr>
<tr>
<td>( \frac{1}{9} )</td>
<td>( \frac{1}{9} )</td>
<td>( \frac{1}{9} )</td>
</tr>
<tr>
<td>( \frac{1}{10} )</td>
<td>( \frac{1}{10} )</td>
<td>( \frac{1}{10} )</td>
</tr>
</tbody>
</table>
## Fraction Chart

<table>
<thead>
<tr>
<th></th>
<th>(\frac{1}{2})</th>
<th>(\frac{1}{2})</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{1}{2})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{3})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
<td>(\frac{1}{4})</td>
</tr>
<tr>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{5})</td>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
<td>(\frac{1}{6})</td>
</tr>
<tr>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
<td>(\frac{1}{7})</td>
</tr>
<tr>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
<td>(\frac{1}{8})</td>
</tr>
<tr>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
<td>(\frac{1}{9})</td>
</tr>
<tr>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
<td>(\frac{1}{10})</td>
</tr>
</tbody>
</table>

**How many fourths are in a whole?**
<table>
<thead>
<tr>
<th>1/3</th>
<th>1/4</th>
<th>1/5</th>
<th>1/6</th>
<th>1/7</th>
<th>1/8</th>
<th>1/9</th>
<th>1/10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/7</td>
<td>1/7</td>
<td>1/7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
<td>1/6</td>
</tr>
<tr>
<td>1/3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1/5</td>
<td>1/5</td>
<td>1/5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1/4</td>
<td></td>
<td>1/4</td>
<td></td>
<td>1/4</td>
</tr>
<tr>
<td>1/2</td>
<td>1/2</td>
<td></td>
<td>1/2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Which is more, one-third or one-fourth?
Compared to Reading

• Just as reading is much more than decoding, phonics, and word attack skills, mathematics is much more more memorizing facts and learning algorithms.

• Just as the goal of learning to read is reading to learn and enjoyment, the goal of math is solving problems and experiencing wonder.
Teaching Math to Children with Special Needs

Joan A. Cotter, Ph.D.
JoanCotter@RightStartMath.com

Sioux Empire Christian Home Educators
Homeschool Conference
Sioux Falls, SD
Saturday, May 2, 2015
3:00 p.m.– 4:00 p.m.