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For more information about the Common Core State Standards and Child Development, check out these websites:

- Tennessee Common Core at www.TNCORE.org
- Read Tennessee website at www.Readtennessee.org

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Helping Children Learn in the Primary and Elementary Years

MATH

Kindergarten to Grade 5

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A GUIDE TO THE MATH COMMON CORE STATE STANDARDS FOR PARENTS AND STUDENTS
Purpose of This Booklet

This booklet has two goals:

- to help parents understand more about what their children are learning in school, and
- to help students know if they have mastered the skills their teachers expect them to know in each grade

Teachers work from a set of standards that tell them what to teach. Each state has created its own standards, and those standards have not been the same across our country. However, most states have recently agreed to use the same set of standards — the Common Core State Standards. More information is included about the Common Core State Standards in the following pages.

This booklet will explain what the Common Core State Standards are, and about the skills on which Tennessee teachers will focus math instruction while transitioning to the Common Core State Standards. You will find general information that will give you an overview of what the standards are and why states are using them.

At the end of each grade’s lists of standards and explanations, you will find a box with an “I can do it!” checklist. These are short statements about the skills your children will be expected to have mastered by the end of the year. Ask your children to look at them to see if they feel they have mastered those skills, or if they need some extra help in specific areas.

We hope you will find this booklet helpful in your effort to be a partner in your child’s education and development.

If you come across a math term and don’t remember what it is or what it means, check out the Math is Fun dictionary at www.mathisfun.com/definitions
What are the Common Core State Standards?

Academic standards are statements that describe the goals of schooling — what children should know or be able to do at the end of the school year. For example, the second grade math standards state that by the end of the school year, a second grader should be able to count to 120 and understand what each digit in a three-digit number represents.

However, standards have not been the same across the United States. In the past, states have had their own sets of standards. This means that children in one state may be learning different things at different times (and in different years) than children in another state. Many states have recently agreed to use a common set of standards for learning that takes place in their classrooms; these are the Common Core State Standards (CCSS).

One major benefit of having common standards across states is that children are being required to learn the same information in the same years in each of those states, so that a child moving from one state to another will not be behind the children in the new location. A common set of standards ensures that all students, no matter where they live, are focused on graduating from high school prepared for postsecondary education and careers.

The Common Core State Standards for Math have two components: Standards for Mathematical Practice and Standards for Mathematical Content. The Practice Standards describe the kind of math teaching and learning that will produce the most successful learning and that will help students dig deeper and better understand math. The Content Standards outline the concepts and skills to be learned in each grade; teachers will balance procedural skills with understanding by finding find ways to engage students in good practices that will help them understand the math content as they grow in math maturity and expertise throughout the elementary, middle, and high school years.

The Common Core State Standards will provide students, teachers, and parents with a shared understanding of what students are learning. With students, parents, and teachers all on the same page and working together for shared goals, we can increase the likelihood that students will make progress each year and will graduate from school prepared to succeed and to build a strong future for themselves and the country.

Parents: In this booklet, you will find an overview of the standards for each grade, showing you what your children should be able to do by the end of the school year. At the end of the section, you will find a box with this “I can do it!” symbol. Discuss these items with your child to see if he/she is able to complete these tasks.

Students: Find the “I can do it!” box at the end of each section and check yourself to see if you can do all those things.
Overview of Goals for Standards for Mathematical Practice

The Standards for Mathematical Practice describe skills and behaviors that all students should be developing in their particular grades. These practices include important processes (ways of doing things) and proficiencies (how well we do things), including problem solving, reasoning and proof, communication, representation, and making connections. These practices will allow students to understand and use math with confidence. Following is what children will be working to be able to do with increasing ease:

**Make sense of problems and persevere in solving them**
- Find the meaning in problems
- Analyze, predict, and plan the path to solve a problem
- Verify answers
- Ask themselves the question: “Does this make sense?”

**Reason abstractly and quantitatively**
- Be able to translate the meaning of each math term in any equation
- Interpret results in the context (setting) of the situation

**Construct arguments and evaluate the reasoning of others**
- Understand and use information to build arguments
- Make and explore the truth of estimates and guesses
- Justify conclusions and respond to arguments of others

**Model with mathematics**
- Apply math to problems in everyday life
- Identify quantities (amounts, numbers) in a practical situation
- Present, show, or explain the problem and solution in an understandable way

**Use appropriate tools strategically**
- Consider the available tools when solving problems, and know which tool is most appropriate in the situation
- Be familiar with tools appropriate for their grade level or course (pencil and paper, concrete models, ruler, protractor, calculator, spreadsheet, computer programs, digital content on a website, and other technological tools)

**Be precise**
- Be able to communicate accurately with others
- Use clear definitions, state the meaning of symbols, and be careful when specifying units of measure and labeling axes (the “x” and “y” lines that cross at right angles to make a graph) in math figures
- Calculate accurately and efficiently

**Look for and make use of structure**
- Recognize patterns and structures
- Step back to find the big picture and be able to shift perspective
- See complicated things as single objects, or as being made up of several objects

**Look for and identify ways to create shortcuts when doing problems**
- When calculations are repeated, look for general methods, patterns, and shortcuts
- Be able to evaluate whether an answer makes sense

The major domains included in the math standards for Grades K-5 are listed below. In each grade, students build on what they learned previously to form a progression of increasing knowledge, skill, or sophistication.

<table>
<thead>
<tr>
<th>MAJOR DOMAINS FOR MATH STANDARDS</th>
<th>KINDERGARTEN</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counting and Cardinality</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations and Algebraic Thinking</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Numbers and Operations – Base Ten</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Numbers and Operations – Fractions</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement and Data</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Geometry</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
The Common Core State Standards in Mathematics present an opportunity to engage Tennessee students in deeper problem solving and critical thinking that will build the math and reading skills students will need for success. The new core standards will allow teachers to provide focus, coherence, and rigor (difficulty and thoroughness). Students will think more deeply and know more than how to just get the answer or read the words on the page — they will understand! Teachers will link major topics within grades — math includes reading and reading includes math (and other subjects as well). Finally, teachers will provide more challenge to students so they will understand how to apply what they are learning to the real world.

While teachers will teach all of the standards, they will focus instruction on specific areas that will build stronger understanding. To help teachers ease into the move from the Tennessee State Standards to the Common Core State Standards, educators in the state of Tennessee have created a list of clusters (TNCORE Focus Clusters) on which teachers will focus instruction in the next two years. Clusters are groups of standards that connect needed concepts and skills. The table below shows the focus areas for each grade for school years 2012-2013 and 2013-2014. In addition, teachers will still be teaching some of the information outlined in the Tennessee State Standards. Eventually, Tennessee teachers will be moving fully to the Common Core State Standards.

<table>
<thead>
<tr>
<th>GRADE</th>
<th>TNCORE FOCUS CLUSTERS FOR MATH – 2012-2013 and 2013-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindergarten</td>
<td>• Know number names and the count sequence.</td>
</tr>
<tr>
<td></td>
<td>• Count to tell the number of objects.</td>
</tr>
<tr>
<td></td>
<td>• Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</td>
</tr>
<tr>
<td></td>
<td>• Work with numbers 11-19 to gain foundations for place value.</td>
</tr>
<tr>
<td>1st Grade</td>
<td>• Represent and solve problems involving addition and subtraction.</td>
</tr>
<tr>
<td></td>
<td>• Understand and apply properties of operations and the relationship between addition and subtraction.</td>
</tr>
<tr>
<td></td>
<td>• Understand place value.</td>
</tr>
<tr>
<td></td>
<td>• Use place value understanding and properties of operations to add and subtract.</td>
</tr>
<tr>
<td>2nd Grade</td>
<td>• Represent and solve problems involving addition and subtraction.</td>
</tr>
<tr>
<td></td>
<td>• Understand place value.</td>
</tr>
<tr>
<td></td>
<td>• Use place value understanding and properties of operations to add and subtract.</td>
</tr>
<tr>
<td></td>
<td>• Relate addition and subtraction to length.</td>
</tr>
<tr>
<td>3rd Grade</td>
<td>• Represent and solve problems involving multiplication and division.</td>
</tr>
<tr>
<td></td>
<td>• Understand properties of multiplication and the relationship between multiplication and division.</td>
</tr>
<tr>
<td></td>
<td>• Develop understanding of fractions as numbers.</td>
</tr>
<tr>
<td></td>
<td>• Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</td>
</tr>
<tr>
<td>4th Grade</td>
<td>• Extend understanding of fraction equivalence and ordering.</td>
</tr>
<tr>
<td></td>
<td>• Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers.</td>
</tr>
<tr>
<td></td>
<td>• Use the four operations with whole numbers to solve problems.</td>
</tr>
<tr>
<td></td>
<td>• Generalize place value understanding for multi-digit whole numbers.</td>
</tr>
<tr>
<td>5th Grade</td>
<td>• Use equivalent fractions as a strategy to add and subtract fractions.</td>
</tr>
<tr>
<td></td>
<td>• Apply and extend previous understanding of multiplication and division to multiply and divide fractions.</td>
</tr>
<tr>
<td></td>
<td>• Understand the place value system.</td>
</tr>
<tr>
<td></td>
<td>• Perform operations with multi-digit whole numbers and with decimals to hundredths.</td>
</tr>
</tbody>
</table>
Kindergarten Math

Focus Clusters for Kindergarten – In kindergarten, teachers will focus instruction on these specific areas:

- Know number names and the count sequence.
- Count to tell the number of objects.
- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.
- Work with numbers 11-19 to gain foundations for place value.

Skills that focus on these areas appear in the shaded box below. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For kindergarteners, the math standards outline the skills that should be developing, so that a student can say, “I can … (insert math goal),” for example, “I can count to 100.” Help your child develop these skills:

Counting and Cardinality (Number and Operations)

- Count to 100 by ones (1, 2, 3…) and by tens (10, 20, 30…)
  1, 2, 3, 4, 5, 6, 7, 8, 9, 10…  10, 20, 30, 40, 50…

- Write numbers from 1 to 20, and be able to compare them (6 is more than 3).

- Count objects to 20, and compare sets of numbers to see which has more or less.
  Are two sets of objects equal, or does one set have greater or fewer objects?
Operations and Algebraic Thinking

- Demonstrate subtraction and addition with objects, fingers, claps, or equations.
  
  ![Hand illustrations]
  
  How many claps were there? \(4 + 3 = 7\)

- Solve addition and subtraction problems up to 10 with objects, and be able to write the equation. For example, \(5 = 2 + 3\) and \(5 = 4 + 1\).

- Find the number needed to add to any number from 1 to 9 that will equal 10.

- Fluently add and subtract within 5. Examples are:
  
  \[
  1 + \_ = 5 \quad 3 + 2 = \_ \quad 5 - \_ = 3 \quad 3 - 2 = \_ \quad 4 + 0 = \_ \quad \_ + 2 = 2
  \]

Data and Measurement

- Describe measurable attributes, such as length and weight.
  
  Which is longer? Which weighs more?

  ![Comparative images]

- Compare the attributes of two objects.
  
  smaller/larger \quad longer/shorter \quad less than/more of
  
  heavier/lighter \quad wider/narrower
Classify, count, and sort the objects in each category.

Geometry and Spatial Sense

- Identify and describe shapes – squares, circles, triangles, rectangles, hexagons, cubes, cones, and spheres.

- Understand that a shape is still the same shape no matter how big or little or how it is turned.

- Use words that describe the positions of objects — in front of, next to, above, below, behind.

- Compare shapes by describing their similarities, differences, and parts — number of sides, vertices/corners, straight or curved edges, one dimension/flat or two dimensions/solid.

- Model shapes by drawing them or building with clay, and put shapes together to make other shapes.
**Kindergarten Student Self-Check List**

**Students:** You have been working on learning these skills this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Check Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>I know number names and am able to count to 100.</td>
<td></td>
</tr>
<tr>
<td>I can write the numbers from 0 to 20.</td>
<td></td>
</tr>
<tr>
<td>I know about place value in the numbers 11-20, and can tell how many tens and ones there are in numbers to 20.</td>
<td></td>
</tr>
<tr>
<td>I can count objects to tell the number of things in a group up to 20.</td>
<td></td>
</tr>
<tr>
<td>I can compare numbers and groups to say if one group is bigger or smaller, or if groups are equal.</td>
<td></td>
</tr>
<tr>
<td>I can fluently (quickly, easily) add and subtract within 5.</td>
<td></td>
</tr>
<tr>
<td>I understand that addition is putting groups together and adding to groups. I understand that subtraction is taking groups apart and taking away from groups.</td>
<td></td>
</tr>
<tr>
<td>I understand the concepts of time (morning, afternoon, evening, etc.).</td>
<td></td>
</tr>
<tr>
<td>I know about the tools that measure time (clock, calendar, etc.).</td>
<td></td>
</tr>
<tr>
<td>I can sort objects into groups by likeness, color, size, etc.</td>
<td></td>
</tr>
<tr>
<td>I can identify and describe shapes.</td>
<td></td>
</tr>
</tbody>
</table>
First Grade Math

Focus Clusters for First Grade – In first grade, teachers will focus instruction on these specific areas:

• Represent and solve problems involving addition and subtraction.

• Understand and apply properties of operations and the relationship between addition and subtraction.

• Understand place value.

• Use place value understanding and properties of operations to add and subtract.

Skills that focus on these areas appear in the shaded box below. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For first graders, the math standards outline the skills that should be developing, so that a student can say, “I can … (insert math goal),” for example, “I can count to 120.” Help your child develop these skills:

Numbers and Operations in Base Ten

■ Count to 120, starting at any number less than 120, and read and write the numerals to 120.

■ Understand the concept of base ten — a ten is made up of ten “ones” and a hundred is made up of 10 “tens.”

■ Understand that a two-digit number represents tens and ones. For the number 98:
  • The last digit on the right is the number of units, or “ones” — 8
  • The next digit to the left of the ones means how many “tens,” or bundles of ten “ones” — 9
Measurement and Data

- Order three objects by length.
- Express the length of an object as a whole number of length units by laying multiple copies of a shorter object end to end.

<table>
<thead>
<tr>
<th>tens</th>
<th>ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Algebra and Patterns

- Use addition and subtraction within 20 to solve word problems involving adding to, taking from, taking apart, and comparing, using symbols to represent unknown problems.
- Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, and use objects, drawings, and equations with a symbol to represent the problem.
- Add and subtract within 20; understand the relationship between addition and subtraction.
  
  If $2 + 6 = 8$, then $8 - 6 = 2$ and $8 - 2 = 6$
  
- Understand the meaning of the equal sign (=) and determine if equations are true or false.
  Which of these equations is true and which are false?

  
  $6 = 6$  $7 = 8 - 1$  $5 + 2 = 2 + 5$  $4 + 1 = 5 + 2$

- Determine the unknown whole number in an addition or subtraction equation.

  $8 + ? = 11$  $5 = ? - 3$  $6 = 6 + ?$  $10 = 20 - ?$

Measurement and Data

- Order three objects by length.
- Express the length of an object as a whole number of length units by laying multiple copies of a shorter object end to end.
Tell and write time in hours and half hours using digital and analog clocks.

Organize, represent, interpret, and discuss data with up to three categories.

<table>
<thead>
<tr>
<th>cat</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>dog</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are there more dogs or cats?

Geometry and Spatial Sense

Distinguish between defining attributes (triangles are closed and three-sided) versus non-defining attributes (color, orientation, overall size).

Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three dimensional shapes (cubes, right rectangle prisms, right circular cones, and right circular cylinders), and create new shapes by combining other shapes.

Partition circles and squares into two and four equal parts, and describe the shares using halves and fourths.
**First Grade Student Self-Check List**

**Students:** You have been working on learning these skills this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can solve addition and subtraction word problems within 20.</td>
<td></td>
</tr>
<tr>
<td>I understand the relationship between addition and subtraction.</td>
<td></td>
</tr>
<tr>
<td>I can apply the properties of operations:</td>
<td></td>
</tr>
<tr>
<td>• Commutative property of addition (it does not matter which order the numbers are in for addition): If you know $8 + 3 = 11$, then you know $3 + 8 = 11$.</td>
<td></td>
</tr>
<tr>
<td>• Associative property of addition (it does not matter if you regroup the numbers in addition): To add $2 + 6 + 4$, the second two numbers can be added to make a ten, so $2 + 6 + 4 = 2 + 10 = 12$.</td>
<td></td>
</tr>
<tr>
<td>I can add and subtract within 20.</td>
<td></td>
</tr>
<tr>
<td>I can count to 120, starting at any number.</td>
<td></td>
</tr>
<tr>
<td>I understand the meaning of the equal sign.</td>
<td></td>
</tr>
<tr>
<td>I understand place value: ones, tens.</td>
<td></td>
</tr>
<tr>
<td>I can use place value to add and subtract within 100.</td>
<td></td>
</tr>
<tr>
<td>I can measure lengths and tell the measurement in units.</td>
<td></td>
</tr>
<tr>
<td>I can tell and write time in analog and digital time.</td>
<td></td>
</tr>
<tr>
<td>I relate time to events: before/after, shorter/longer, etc.</td>
<td></td>
</tr>
<tr>
<td>I can build and talk about a graph.</td>
<td></td>
</tr>
</tbody>
</table>
Second Grade Math

Focus Clusters for Second Grade – In second grade, teachers will focus instruction on these specific areas:

- Represent and solve problems involving addition and subtraction.
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.
- Relate addition and subtraction to length.

Skills that focus on these areas appear in the shaded box below. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For second graders, the math standards outline the skills that should be developing, so that a student can say, “I can … (insert math goal),” for example, “I can count to 1000.” Help your child develop these skills:

Numbers and Operations

- Understand place value: that 100 can be thought of as a bundle of ten tens and that the three digits of a three-digit number represent amounts of hundreds, tens, and ones.

For example, \(706\) = \[
\begin{array}{c|c|c|c}
\text{hundreds} & \text{tens} & \text{ones} \\
\hline
7 & 0 & 6 \\
\end{array}
\] and \(327\) = \[
\begin{array}{c|c|c|c}
\text{hundreds} & \text{tens} & \text{ones} \\
\hline
3 & 2 & 7 \\
\end{array}
\]

- Count to 1000, by 1s (1, 2, 3…), 5s (5, 10, 15…), 10s (10, 20, 30…) and 100s (100, 200, 300…).

- Read and write to 1000 using base-ten numerals (the decimal number system that we use every day has 10 digits \([0,1,2,3,4,5,6,7,8,9]\) and so it is Base-10), number names, (ten, twenty, thirty), and expanded form (123 is \(100 + 20 + 3\)).
Compare two three-digit numbers using $>$ (more than) 123 > 120; $<$ (less than) 608 < 680, and $=$ (is equal to) 414 = 200 + 214

Use place value understanding and properties of operations to add and subtract.
- Fluently (quickly and easily) add and subtract within 100
- Add up to four two-digit numbers
- Add and subtract up to 1000, using concrete models or drawings
- Mentally add 10 or 100 to any given number from 100 to 900, and mentally subtract 10 or 100
- Understand and explain why subtraction and addition work, using place value and properties of operations

Algebra and Patterns

Use addition and subtraction within 100 to solve one- and two-step word problems that add to, take from, put together, take apart, and compare.
John has 33 marbles, and Jim has 3 more than John. How many marbles does Jim have? ($X = 33 + 3$)

Fluently add and subtract within 20 mentally. By the end of the year, know from memory all sums of two one-digit numbers. ($1 + 1, 2, 3, 4, 5, 6, 7, 8, 9; 2 + 1, 2, 3...; \text{ up to } 9 + 1, 2, 3...$)

Determine whether groups of numbers have an odd or even number of items. Count items by 2s (2, 4, 6...)

Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and 5 columns; write an equation to express the total as a sum of addends.

\[ \begin{array}{cccccc} \hline & & & & & 5 \\ \hline & & & & & 5 \\ \hline & & & & & 5 \\ \hline & & & & & 2 \\ \hline \end{array} \]

Equation is
\[5 + 5 + 5 + 2 = 17\]
Measurement and Data

- Measure and estimate lengths by using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

- Estimate lengths using units of inches, feet, centimeters, and meters.

- Measure two or more items to find the difference in inches, feet, yards, meters.

- Use addition and subtraction within 100 to solve word problems involving lengths given in the same unit. Megan is 54 inches tall and Kate is 48 inches. Who is taller and by how much?

- Represent numbers and lengths on a number line.

- Tell and write time to the nearest five minutes, using both analog and digital time.

- Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies using $ and ¢. (If you have 2 dimes and 3 pennies, how many cents do you have?)

- Generate measurement data by measuring several items and make a line plot using whole number units on the horizontal scale.
Draw a picture graph and a bar graph using a data set with up to four categories.

**Favorite Desserts**

<table>
<thead>
<tr>
<th>Dessert</th>
<th>图</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fudge cake</td>
<td>🍪</td>
</tr>
<tr>
<td>Cookies</td>
<td>🍪_cookie</td>
</tr>
<tr>
<td>Banana split</td>
<td>🍌</td>
</tr>
<tr>
<td>Double fudge brownies</td>
<td>🍪_brownies</td>
</tr>
</tbody>
</table>

**KEY:** 🍪 = 1 person

How many students chose each of the desserts?
Which dessert was chosen most often?

![Bar graph of favorite desserts](image)

Which animal was chosen by the most students?
Which animal was chosen by the least number of students?

**Geometry and Spatial Sense**

- Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.
- Partition a rectangle into rows and columns of same size squares and count to find the number of squares.

- Partition circles, squares, and rectangles into two, three or four equal shares and describe the shares using the words halves, thirds, fourths, half of, a third of, a quarter of, etc.
**Second Grade Student Self-Check List**

**Students:** You have been working on learning these skills this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solve addition and subtraction word problems within 100.</td>
<td></td>
</tr>
<tr>
<td>Fluently add and subtract within 20.</td>
<td></td>
</tr>
<tr>
<td>Know all sums of two one-digit numbers.</td>
<td></td>
</tr>
<tr>
<td>Work with equal groups and repeated addition to understand multiplication.</td>
<td></td>
</tr>
<tr>
<td>Work with equal groups and repeated subtraction to understand division.</td>
<td></td>
</tr>
<tr>
<td>Understand place value: ones, tens, and hundreds.</td>
<td></td>
</tr>
<tr>
<td>Use place value to add and subtract within 1000.</td>
<td></td>
</tr>
<tr>
<td>Make reasonable estimates using place value knowledge.</td>
<td></td>
</tr>
<tr>
<td>Measure, estimate, and compare lengths in standard units.</td>
<td></td>
</tr>
<tr>
<td>Represent whole number lengths on a number line.</td>
<td></td>
</tr>
<tr>
<td>Work with time and money.</td>
<td></td>
</tr>
<tr>
<td>Know relationships of time (minutes in an hour, days in a month, etc.).</td>
<td></td>
</tr>
<tr>
<td>Solve word problems using combinations of dollar bills and coins.</td>
<td></td>
</tr>
<tr>
<td>Collect data, build a graph, and answer questions about the data presented.</td>
<td></td>
</tr>
<tr>
<td>Recognize shapes: triangles, quadrilaterals, pentagons, hexagons, and cubes.</td>
<td></td>
</tr>
<tr>
<td>Draw shapes by the size of the angles or by the number of equal faces.</td>
<td></td>
</tr>
</tbody>
</table>
Third Grade Math

Focus Clusters for Third Grade – In third grade, teachers will focus instruction on these specific areas:

- Represent and solve problems involving multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Develop understanding of fractions as numbers.
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

Skills that focus on these areas appear in the shaded box below. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For third graders, the math standards expect the following skills to be developing, so that a student can say, “I can … (insert math goal),” for example, I can fluently multiply and divide within 100.” Help your child develop skills in these areas:

Operations and Algebraic Thinking

- Represent (show) products (the answer when two or more numbers are multiplied together) of whole numbers. Example: interpret or show 5 x 7 as 5 groups of 7.

- Interpret (show) whole number quotients (the answer after you divide one number by another) of whole numbers. Example: 35 ÷ 7 = 5.

- Use multiplication and division within 100 to solve word problems by using drawings and equations with symbols for the unknown number. Examples: 100 ÷ 5 = ___; 10 x ___ = 60; 75 ÷ ___ = 25
Understand the properties of operations in multiplication and division.

- **commutative** – it doesn’t matter in which order numbers are for multiplication. If $4 \times 6 = 24$, then $6 \times 4$ is also 24.

- **associative** – it doesn’t matter how you group the numbers when you multiply. $3 \times 5 \times 2$ is found by $3 \times 5 = 15$ and $15 \times 2 = 30$, or by $5 \times 2 = 10$ and $3 \times 10 = 30$.

- **distributive** – you get the same answer when you multiply a number by a group of numbers added together as when you do each multiplication separately. $8 \times 5 = 40$ and $8 \times 2 = 16$, so $8 \times 7$ is $8 \times (5+2) = (8 \times 5) + (8 \times 2) = 40 + 16$.

Understand division as an unknown factor problem.

Example: $32 \div 8$ is the same as $8 \times \_ = 32$

Fluently (quickly and easily) multiply and divide within 100. By the end of grade 3, know from memory all the products of one-digit numbers (numbers from 1 to 9 times 1 to 9).

Solve two-step word problems using the four operations of addition, subtraction, multiplication, and division. Assess the reasonableness of answers using mental computation and estimation using rounding (taking the number to the nearest ten or hundred).

### 100 Rounding Chart

<table>
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<tr>
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<th>3</th>
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### Multiplication Table

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<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>
Geometry and Spatial Sense (Shapes and Space)

- Understand that shapes in different categories (for example, rhombuses, rectangles, and others) may share attributes (four sides). Recognize rhombuses, squares, and rectangles as examples of quadrilaterals and draw examples of quadrilaterals that do not belong to any of those subcategories, such as a trapezoid or kite.

- Partition shapes into parts with equal areas and express the area as part of a whole.

Measurement and Using Data

- Tell and write time to the nearest minute and solve word problems involving addition and subtraction of time intervals in minutes.

- Measure and estimate liquid volume and masses of objects using grams, kilograms, and liters. Use drawings to represent word problems involving mass or volume given in the same units.

- Draw a picture graph and a bar graph to represent several categories.

Example: How many more or how many less?

<table>
<thead>
<tr>
<th>Varities of Apples in a Food Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Delicious</td>
</tr>
<tr>
<td>Golden Delicious</td>
</tr>
<tr>
<td>Red Rome</td>
</tr>
<tr>
<td>MacIntosh</td>
</tr>
<tr>
<td>Jonathan</td>
</tr>
</tbody>
</table>

| KEY: | = 10 apples  | = 5 apples |

<table>
<thead>
<tr>
<th>Liter Meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 quart</td>
</tr>
<tr>
<td>1 liter</td>
</tr>
<tr>
<td>1 pint</td>
</tr>
<tr>
<td>1 cup</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dogs</th>
<th>Cats</th>
<th>Goldfish</th>
<th>Birds</th>
<th>Hamsters</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>
Algebraic Thinking (Patterns and Relationships)

- Use place value understanding to round whole numbers to the nearest 10 or 100.
- Fluently add and subtract within 1,000.
- Multiply one-digit whole numbers by multiples of 10 (9 x 80, 5 x 60, etc.).
- Understand a fraction $\frac{1}{b}$ as 1 whole partitioned into $b$ equal parts.
  
  For example, $\frac{1}{4} = 1$ of 4 equal parts.

- Understand a fraction as a number on a number line.

- Understand and explain equivalent fractions. $\frac{1}{2} = \frac{4}{8}, \frac{4}{6} = \frac{2}{3}$

- Compare two fractions with the same numerator ($\frac{3}{4}, \frac{3}{5}$) or denominator ($\frac{2}{5}, \frac{4}{5}$).
  Use the symbols < (less than), > (more than), or = (equal) to compare them.

\[
\frac{3}{4} > \frac{3}{5}
\]
## Third Grade Student Self-Check List

**Students:** You have been working on learning these skills this year. The green shaded boxes are the areas teachers gave extra focus to this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can solve multiplication and division problems and understand the relationship between them.</td>
<td></td>
</tr>
<tr>
<td>I understand the properties of multiplication:</td>
<td></td>
</tr>
<tr>
<td>• <strong>Commutative</strong> property of multiplication: If you know 6 x 4 = 24, then you know 4 x 6 = 24.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Associative</strong> property of multiplication: the product of 3 x 5 x 2 can be found by 3 x 5 = 15, then 15 x 2 = 30, or by 5 x 2 = 10, then 3 x 10 = 30.</td>
<td></td>
</tr>
<tr>
<td>• <strong>Distributive</strong> property of multiplication: If 8 x 5 = 40 and 8 x 2 = 16, then 8 x 7 is: 8 x (5 + 2) = (8 x 5) + (8 x 2) 40 + 16 = 56.</td>
<td></td>
</tr>
<tr>
<td>I can fluently multiply and divide within 100.</td>
<td></td>
</tr>
<tr>
<td>I know products of two one-digit numbers.</td>
<td></td>
</tr>
<tr>
<td>I can solve word problems with addition, subtraction, multiplication, and division.</td>
<td></td>
</tr>
<tr>
<td>I can use place value to round numbers and I know the value of each digit in a four-digit number.</td>
<td></td>
</tr>
<tr>
<td>I can estimate reasonable answers using place value knowledge.</td>
<td></td>
</tr>
<tr>
<td>I understand fractions as numbers.</td>
<td></td>
</tr>
<tr>
<td>I recognize simple equivalent fractions.</td>
<td></td>
</tr>
<tr>
<td>I can compare two fractions with the same numerator or the same denominator.</td>
<td></td>
</tr>
<tr>
<td>I know that 25 cents is ¼ of a dollar, 50 cents is ½ of a dollar and 75 cents is ¾ of a dollar.</td>
<td></td>
</tr>
<tr>
<td>I can tell and write time to the nearest minute.</td>
<td></td>
</tr>
<tr>
<td>I can estimate and measure time, volume, and weight.</td>
<td></td>
</tr>
<tr>
<td>I understand area and perimeter.</td>
<td></td>
</tr>
<tr>
<td>I understand that shapes in different categories can also be in a larger category.</td>
<td></td>
</tr>
</tbody>
</table>
Fourth Grade Math

**Focus Clusters for Fourth Grade** – in fourth grade, teachers will focus instruction on these areas:

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions by applying and expanding previous understanding of operations of whole numbers.
- Use the four operations with whole numbers to solve problems.
- Generalize place value understanding for multi-digit whole numbers.

Skills that focus on these areas appear in the shaded box below. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For fourth graders, the math standards expect the following skills to be developing, so that a student can say, “I can … (insert math goal),” for example, I can explain why one fraction is equal to another.” Help your child develop skills in these areas:

**Numbers and Operations – Fractions**

- Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) (n being any number) by using visual fraction models. Multiplying by the same number in the numerator (top or first number) and denominator (bottom or second number) gives the same fraction. For example, (3 x a) / (3 x b) or (12 x a) / (12 x b) gives the same fraction as a/b.

- Compare two fractions with different numerators and different denominators by creating common denominators or numerators. For example, to see if 3/8 is = (equal to), < (less than), or > (more than) 6/12, change the denominators of each fraction to the same number (in this case, 24). The new fractions would become 9/24 (8 into 24 = 3, multiply the numerator (3) by 3) and 12/24 (12 into 24 = 2, multiply numerator (6) by 2).

Since 12 is more than 9, 9/24 is less than (<) 12/24, so 3/8 < 6/12.
- Compare two fractions to a benchmark fraction, like \( \frac{1}{2} \) or \( \frac{1}{3} \). Be able to use a visual fraction model. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.

Benchmark fractions are common fractions that you can judge other numbers against. Often, \( \frac{1}{4} \), \( \frac{1}{2} \), \( \frac{3}{4} \), and often \( \frac{1}{10} \) (because of its relationship with decimals) are referred to as benchmark fractions.

- Decompose a fraction into a sum of fractions with the same denominator, and be able to justify them with equations.

For example, \( \frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8} \), and \( 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8} \).

- Add and subtract mixed numbers (a whole number and a fraction combined into one “mixed” number) with like denominators by replacing each mixed number with an equivalent fraction.

For example, to solve \( 2 \frac{1}{3} + 2 \frac{1}{2} = x \); \( 2 \frac{1}{3} = \frac{7}{3} \) or \( \frac{14}{6} \) and \( 2 \frac{1}{2} = \frac{5}{2} \) or \( \frac{15}{6} \), so \( \frac{14}{6} + \frac{15}{6} = \frac{29}{6} \), or \( 4 \frac{5}{6} \).

- Solve word problems involving addition and subtraction of fractions referring to the same whole number and having like denominators by using visual fraction models and equations to represent the problem. For example, if there are 8 pieces of pizza, and Bill ate 3 and Sue ate 2, how many pieces are left and what fraction of the pizza was eaten?

\[
1 - (\frac{2}{8} + \frac{3}{8})
\]

\[
\frac{8}{8} - (\frac{2}{8} + \frac{3}{8}) = \frac{8}{8} - \frac{5}{8} = \frac{3}{8}
\]

- Understand a fraction \( \frac{a}{b} \) as a multiple of \( \frac{1}{b} \) and use this understanding to multiply a fraction by a whole number. For example, \( 3 \times \frac{2}{5} \) could be shown as \( 6 \times \frac{1}{5} \), with the product being \( \frac{6}{5} \); \( n \times \frac{a}{b} = \frac{n \times a}{b} \), with \( n \) being any number.
Solve word problems involving multiplication of a fraction by a whole number by using fraction models and equations. For example, if each person at a party will eat \( \frac{3}{8} \) pounds of roast beef and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?

\[
5 \times \frac{3}{8} = \frac{15}{8} = 1\frac{7}{8}
\]

venting - Fractions

Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.

For example, express \( \frac{3}{10} \) as \( \frac{30}{100} \), and add \( \frac{3}{10} + \frac{4}{100} \) (\( \frac{3}{10} = \frac{30}{100} \)) + \( \frac{4}{100} \) = \( \frac{34}{100} \).

Use decimal notation for fractions with denominators 10 or 100. For example, rewrite \( \frac{52}{10} \) as .52, and show .52 on the number line.

Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when two decimals refer to the same whole. Record the results of comparisons with pictures or with the symbols >, =, or <.

.5 > .25  .1 < .25
Operations and Algebraic Thinking

- Use the four operations (+, -, ×, ÷) with whole numbers to solve problems.

  - Interpret a multiplication equation as a comparison; for example, interpret $35 = 5 \times 7$ as a statement that 35 is 5 times as many as 7 or 7 times as many as 5.
  - Multiply or divide to solve word problems involving multiplication comparisons by using drawings and equations with a symbol for the unknown number to represent the problem.

$$\begin{array}{c}
35 \\
\div \\
7 \\
= \ x
\end{array}$$

$$35 \div 7 = 5$$

- Solve multi-step word problems posed with whole numbers and having whole number answers using the four operations (+, -, ×, ÷) including problems in which remainders must be interpreted. ($37 \div 4 = 9$ with a remainder of 1) Use a letter to stand for the unknown quantity. ($37 \div 4 = a$).

- Gain familiarity with factors and multiples.

  - Find all factor pairs for a whole number in the range of 1 – 100. **Example:** 3 and 4 are factors of 12, because $3 \times 4 = 12$. Also, $2 \times 6 = 12$ so 2 and 6 are also factors of 12, and $1 \times 12 = 12$ so 1 and 12 are factors of 12 as well. So ALL the factors of 12 are 1, 2, 3, 4, 6 and 12, as well as -1, -2, -3, -4, -6 and -12.

  - Recognize that a whole number is a multiple of its factors (for example, the factors of 12 are $1 \times 12$, $2 \times 6$, $3 \times 4$).

  - Determine whether a given whole number in the range 1 – 100 is a multiple of a given one-digit number. **Example:** Is 25 a multiple of 5? Yes! Is it a multiple of 3? No!

  - Determine whether a given whole number in the range 1 – 100 is prime or composite. A prime number can be divided evenly (without having a remainder) only by 1, or itself. A prime number’s only positive factors are 1 and itself. **Example:** 5 can only be divided evenly by 1 or 5, so it is a prime number. But 6 can be divided evenly by 1, 2, 3 and 6 so it is NOT a prime number (it is a composite number).
Generalize and analyze patterns.

- Generate several number patterns that follow a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule “add 3” and the starting number 1 (1, 4, 7, 10, 13, 16…) see that the resulting sequence appears to alternate between odd and even numbers. Can students tell why the numbers will continue to alternate in this way?

Numbers and Operations in Base Ten

- Generalize place value understanding for multi-digit whole numbers.

  - Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. $700 = 70 \times 10$

- Read and write multi-digit numbers using base-ten numerals (73), number names, (seventy-three) and expanded form (7 tens and 3 ones), and compare two multi-digit numbers using $>$, $<$, and $=$ (23 > 19).

- Use place value understanding to round whole numbers to any place.

  **100 Rounding Chart**

<p>| | | | | | | | | | |</p>
<table>
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</tr>
</tbody>
</table>

- Use place value understanding and properties of operations to perform multi-digit arithmetic.

  - Fluently add and subtract multi-digit whole numbers. $(23 + 32 = 55; \ 55 – 23 = 32)$

  - Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers.
    $345 \times 6 = (6 \times 5 = 30) + (6 \times 40 = 240) + (6 \times 300 = 1800) = 2070$
Measurement and Data

- Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.
  
  - Know relative sizes of units within one system of units, including kilometers, meters, kilograms, grams, pounds, ounces, liters, minutes, hours, and seconds. Be able to express a large unit in terms of a smaller unit.
    
    A 2 ft snake is 24 in, a 3 ft snake is 36 in, and a 4 ft snake is 48 in.
    
    An hour has 60 seconds, and a day has 24 hours.
  
- Use the four operations (+, -, x, ÷) to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals.

- Apply the area and perimeter formulas for rectangles in real world and mathematical problems. For example, find the width of a rectangular room given the area (120 sq ft) and length (12 ft) of the flooring, by viewing the area formula as a multiplication equation with an unknown factor. \((\text{Area} = l \times w; \text{area} \div l = w, \text{so} \frac{120}{12} = 10)\)

- Represent and interpret data.

  - Make a line plot to display a data set of measurements in fractions of a unit \((\frac{1}{2}, \frac{1}{4}, \frac{1}{8})\).
Geometric Measurement
Recognize angles as geometric shapes that are formed whenever two rays share a common endpoint, and understand concepts of angle measurement. Be able to use a protractor to measure angles.

Geometry and Spatial Sense

- Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
  - Draw points, lines, line segments, rays, angles (right angle is a 90° angle, acute angle is less than 90°, and an obtuse angle is one that is more than 90°) and perpendicular and parallel lines.
**Fourth Grade Student Self-Check List**

**Students:** You have been working on learning these skills this year. The green shaded boxes are the areas teachers gave extra focus to this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use addition, subtraction, multiplication, and division with whole numbers to solve word problems.</td>
<td></td>
</tr>
<tr>
<td>Learn about factors and multiples, i.e.,</td>
<td></td>
</tr>
<tr>
<td>• Positive factors of 24 are: 1, 2, 3, 4, 6, 8, 12</td>
<td></td>
</tr>
<tr>
<td>• Some multiples of 4 are: 4, 8, 12, 16, 20…</td>
<td></td>
</tr>
<tr>
<td>Make and describe patterns with objects and numbers.</td>
<td></td>
</tr>
<tr>
<td>Understand and use place value to generalize to 1,000,000.</td>
<td></td>
</tr>
<tr>
<td>• Expanded form: 6783 = 6000 + 700 + 80 + 3</td>
<td></td>
</tr>
<tr>
<td>Compute with multi-digit numbers.</td>
<td></td>
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<tr>
<td>Solve problems involving using multiplication of multi-digit by two-digit numbers.</td>
<td></td>
</tr>
<tr>
<td>Divide multi-digit numbers by one-digit divisor.</td>
<td></td>
</tr>
<tr>
<td>Round multi-digit numbers to any place.</td>
<td></td>
</tr>
<tr>
<td>Build understanding of equivalent fractions and ordering fractions.</td>
<td></td>
</tr>
<tr>
<td>Compare two fractions with different numerators and different denominators by making common denominators.</td>
<td></td>
</tr>
<tr>
<td>Add and subtract fractions and mixed numbers with like denominators.</td>
<td></td>
</tr>
<tr>
<td>Understand the decimal notation for fractions.</td>
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<tr>
<td>Compare decimals.</td>
<td></td>
</tr>
<tr>
<td>Solve problems using measurement conversions.</td>
<td></td>
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<tr>
<td>Apply area and perimeter formulas for rectangles.</td>
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<tr>
<td>Organize and explain data using a line plot.</td>
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<tr>
<td>Understand and measure angles.</td>
<td></td>
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<tr>
<td>Draw and identify lines and angles.</td>
<td></td>
</tr>
<tr>
<td>Describe and sort shapes by their lines and angles.</td>
<td></td>
</tr>
</tbody>
</table>
Fifth Grade Math

Focus Clusters for Fifth Grade – in fifth grade, teachers will focus instruction on these skills:

- Use equivalent fractions as a strategy to add and subtract fractions
- Apply and extend previous understanding of multiplication and division to multiply and divide fractions
- Understand the place value system.
- Perform operations with multi-digit whole numbers and with decimals to hundredths.

Skills that focus on these areas appear in the shaded areas in the following pages. While these skills are priority areas, students will be learning all of the skills listed in the following sections.

For fifth graders, the math standards expect the following skills to be developing, so that a student can say, “I can … (insert math goal),” for example, I can compare decimals up to thousandths.” Help your child develop skills in these areas:

Operations and Algebraic Thinking

- Write and interpret numerical expressions.
- Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

Examples:

\[
\begin{align*}
(26 + 18) \div 4 & \quad \text{Answer: 11} \\
[[2 \times (3+5)] - 9] + [5 \times (23-18)] & \quad \text{Answer: 32} \\
12 - (0.4 \times 2) & \quad \text{Answer: 11.2} \\
(2 + 3) \times (1.5 - 0.5) & \quad \text{Answer: 5} \\
6 - \left( \frac{1}{2} + \frac{1}{3} \right) & \quad \text{Answer: 5 \frac{1}{6}} \\
\{80 [2 \times (3 \frac{1}{2} + 1 \frac{1}{2})] + 100 & \quad \text{Answer: 900}
\end{align*}
\]

Order of Operations

1. Simplify insided grouping of parentheses, brackets, and braces first.
2. Simplify the exponents.
3. Do the multiplication and division in order from left to right.
4. Do the addition and subtraction in order from left to right.

Remember the order by using this phrase:

Please Excuse My Dear Aunt Sally (Parenthesis, Exponents, Multiply, Divide, Add, Subtract)
• Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them (doing the math). For example, express the calculation “add 8 and 7, then multiply by 2” as 2 x (8 + 7). Recognize that 3 x (18932 + 921) is three times as large as 18932 + 921 without having to calculate the indicated sum or product.

• Analyze patterns and relationships. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “add 3” and the starting number 0, and given the rule “add 6” and the starting number 0, generate terms in the resulting sequences and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so. (6 is twice as much as 3.)

**Students might think and/or say:**
“I noticed that every time I multiplied by 10, I added a zero to the end of the number. That makes sense because each digit’s value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left. When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones).”

**Numbers and Operations in Base Ten**

■ Understand the place value system.

• Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to the right and \( \frac{1}{10} \) of what it represents in the place to its left. For example, in the number 555, the 5 on the right represents 5, the 5 in the middle represents 50 and the 5 on the left represents 500.

• Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10.
Read, write, and compare decimals to thousandths.

- Read and write decimals to thousandths using base-ten numerals, number names, and expanded form

**Example:**
Some equivalent forms of 0.72

\[
\begin{align*}
\frac{72}{100} & \quad \frac{70}{100} + \frac{2}{100} \\
\frac{7}{10} + \frac{2}{100} & \quad 0.720 \\
7 \times \frac{1}{10} + 2 \times \frac{1}{100} & \quad 7 \times \frac{1}{10} + 2 \times \frac{1}{100} + 0 \times \frac{1}{1000} \\
0.70 + 0.02 & \quad \frac{720}{1000}
\end{align*}
\]

- Compare two decimals to thousandths based on meanings of the digits in each place, using >, <, and = symbols to record the results of comparisons. Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500) and 1. Comparing tenths to tenths, hundredths to hundredths, and thousands to thousandths is simplified if students use their understanding of fractions to compare decimals.

- Use place value understanding to round decimals to any place.

  **For example: Round 14.235 to the nearest tenth.**

  Students recognize that the possible answer must be in tenths, thus, it is either 14.2 or 14.3. They then identify that 14.235 is closer to 14.2 (14.20) than to 14.3 (14.30).

- Perform operations with multi-digit whole numbers and with decimals to hundredths.

  This standard asks students to select and use a variety of methods and tools to compute, including objects, mental computation, paper and pencil, and calculators. They work with basic number combinations and use visual models, benchmarks, and equivalent forms. They are fluent — accurate and efficient, using a reasonable number of steps. They are flexible — they use strategies such as the distributive property or breaking numbers apart (decomposing and recomposing). They change strategies according to the numbers in the problem (26 x 4) may lend itself to (25 x 4) + 4, whereas another problem might lend itself to making an equivalent problem (32 x 4 = 64 x 2).

Fluently multiply multi-digit whole numbers.

Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.

Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Numbers and Operations – Fractions**

- Use equivalent fractions as a strategy to add and subtract fractions.
  - Add and subtract fractions with unlike denominators including mixed numbers (a number represented by a whole number and a fraction, like 2 \( \frac{1}{2} \)) by replacing fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
    
    **For example, if the equation is** \( \frac{2}{3} + \frac{5}{4} \)
    
    **Formula:** \( \frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd} \)
    
    **Solution:** \( \frac{2}{3} + \frac{5}{4} = \frac{2x4 + 3x5}{3x4} \), or \( \frac{8 + 15}{12} = \frac{23}{12} \)
  - Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, and estimate mentally and assess the reasonableness of answers.
    
    **For example, recognize that** \( \frac{2}{5} + \frac{1}{2} = \frac{3}{7} \) **is incorrect because** \( \frac{3}{7} < \frac{1}{2} \)

**Apply and extend previous understandings of multiplication and division to multiply and divide fractions.**

- Interpret a fraction as division of the numerator by the denominator \( \left( \frac{a}{b} = a \div b \right) \).
  - Solve word problems involving division of whole numbers leading to answers in forms of fractions or mixed numbers, using visual fraction models (drawing a picture of the problem) and equations to represent the problem.
    
    **For example, I have six squares that I want to divide by one half. How many pieces would I have?**

    \[
    6 \div \frac{1}{2} = 12
    \]
Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. The formula is \( a \times \frac{q}{b} \).

- Interpret the product \( \left( \frac{a}{b} \right) \times q \) as a fractional portion \( \frac{a}{b} \) of \( q \), for example, interpret \( \left( \frac{2}{3} \right) \times 4 \) as \( 2 \times 4 \div 3 = \frac{8}{3} \).
- Also, multiply fractions, such as \( \left( \frac{2}{3} \right) \times \left( \frac{4}{5} \right) \), using the formula \( \left( \frac{a}{b} \right) \times \left( \frac{c}{d} \right) = \frac{ac}{bd} \)
  \[
  \left( \frac{2}{3} \right) \times \left( \frac{4}{5} \right) = \frac{(2 \times 4)}{(3 \times 5)} = \frac{8}{15}, \text{ or } \frac{8}{15}
  \]
- Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying side lengths. Multiply fractional side lengths to find areas of rectangles.
  
  For example, \( \frac{2}{3} \times \frac{4}{5} \).

\[
\begin{array}{c|c|c|c|c}
\hline
& & & & \\
& 4 & 5 & & \\
\hline
1 & 1 & 1 & 1 & 1 \\
\hline
\end{array}
\]

- Interpret multiplication as scaling (resizing) by comparing the size of one factor on the basis of the size of the other; for example, how does the product of \( 225 \times 60 \) compare to the product of \( 225 \times 30 \)? How do you know? Since 30 is half of 60, the product of \( 225 \times 60 \) will be double or twice as large as the product of \( 225 \times 30 \).
- Explain why multiplying a given number by a fraction greater than 1 results in a product greater than the given number, and multiplying a given number by a fraction less than 1 results in a product smaller than the given number.
- Solve real world problems involving multiplication of fractions and mixed numbers by using visual fraction models or equations to represent the problem.

Example: Evan has 6 balls, and $\frac{2}{3}$ of them are green. How many green balls are there?

To use a visual model, a student might put the 6 balls into 2 equal groups of 3 (2 green balls and 1 black ball). He will see that there are 2 green balls in each of 2 groups, so there are 4 green balls.

A student can use an equation to solve. $\frac{2}{3} \times 6 = \frac{12}{3} = 4$ green balls

- Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.

- Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for $(\frac{1}{3}) \div 4$, and use a visual fraction model to show the quotient.

Example: Four students sitting at a table were given $\frac{1}{3}$ of a pan of brownies to share. How much of a pan will each student get if they share the pan of brownies equally? The diagram shows the $\frac{1}{3}$ pan divided into 4 equal shares with each share equaling $\frac{1}{12}$ of the pan.
- Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div \left( \frac{1}{5} \right)$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div \left( \frac{1}{5} \right) = 20$ because $20 \left( \frac{1}{5} \right) = 4$.

Angelo has 4 lbs of peanuts. He wants to give each of his friends $\frac{1}{5}$ lb. How many friends can receive $\frac{1}{5}$ lb of peanuts? A diagram for $4 \div \frac{1}{5}$ is shown below. Students explain that since there are five fifths in one whole, there must be 20 fifths in 4 lbs.

![Diagram showing division of 4 pounds by $\frac{1}{5}$]

- Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.

How many $\frac{1}{3}$ cup servings are in 2 cups of raisins?

Student: I know that there are three $\frac{1}{3}$ cup servings in 1 cup of raisins. Therefore, there are 6 servings in 2 cups of raisins. I can also show this: 2 divided by $\frac{1}{3} = 2 \times 3 = 6$ servings of raisins.
Measurement and Data

- Convert like measurement units within a given measurement system (for example, convert centimeters to milliliters, ounces to quarts, or inches to feet) and use these conversions in solving real-life problems. For a chart that will help you convert measurements, go to http://www.mce.k12tn.net/math/measurement/measurement_chart.htm

- Represent and interpret data. Make a line plot to display a set of measurements in fractions of a unit (\( \frac{1}{2}, \frac{1}{4}, \frac{1}{8} \)). Use operations of fractions to solve problems involving information presented in plot lines. For example, find the amount of liquid each beaker would contain if the total amount in all of the beakers was redistributed equally.

Students apply their understanding of operations with fractions. They use either addition and/or multiplication to determine the total number of liters in the beakers. Then the sum of the liters is shared evenly among the ten beakers. Ten beakers, measured in liters, are filled with a liquid.

\[
4 \times \frac{1}{8} + (2 \times \frac{1}{4}) ÷ (3 \times \frac{1}{2})
\]

\[
\frac{4}{8} + \frac{2}{4} + \frac{3}{2} = \frac{4}{8} + \frac{4}{8} + \frac{12}{8} = \frac{20}{8}
\]

\[
\frac{20}{8} ÷ 10 = \frac{2}{8}, \text{ so when divided evenly, each beaker would get } \frac{2}{8}, \text{ or } \frac{1}{4} \text{ liters of liquid.}
\]

- Geometric Measurement: Understand concepts of volume and relate volume to multiplication and addition.

  - Recognize volume as an attribute of solid figures and understand concepts of volume measurement

    - A cube with side length one unit, called a “unit cube,” is said to have the volume of one cubic unit.

    - A solid figure that can be packed without gaps or overlaps using n unit cubes is said to have the volume of n cubic units.

<table>
<thead>
<tr>
<th>Amount of Liquid in Liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>
• Relate volume to the operations of multiplication and addition and solve real world problems involving volume.

Students understand that same sized cubic units are used to measure volume. They select appropriate units to measure volume. For example, they make a distinction between which units are more appropriate for measuring the volume of a gym and the volume of a box of books. They can also improvise a cubic unit using any unit as a length (e.g., the length of their pencil). Students can apply these ideas by filling containers with cubic units (wooden cubes) to find the volume. They may also use drawings or interactive computer software to simulate the same filling process.

![Diagram of a cube with dimensions labeled: length = 4, width = 2, height = 3. The volume of this figure is 24 cubic units.](image)

The volume of this figure is 24 cubic units. \( V = l \times w \times h \)
Geometry

- Graph points on the coordinate plane to solve real world and mathematical problems.

- Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis (the x axis, or horizontal line), and the second number indicates how far to travel in the direction of the second axis (the y axis, or vertical line).

- Classify two-dimensional figures into categories based on their properties.

- Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. **For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.**

- Classify two-dimensional figures in a hierarchy based on properties.

**Possible student solutions**

1. **Polygon** – a closed plane figure formed from line segments that meet only at their endpoints.
2. **Quadrilateral** – a four-sided polygon.
3. **Rectangle** – a quadrilateral with two pairs of congruent parallel sides and four right angles.
4. **Rhombus** – a parallelogram with all four sides equal in length.
5. **Square** – a parallelogram with four congruent sides and four right angles.
**Fifth Grade Student Self-Check List**

**Students:** You have been working on learning these skills this year. The green shaded boxes are the areas teachers gave extra focus to this year. Are you able to do these things? Check the box next to the skill if you can do it.

<table>
<thead>
<tr>
<th>Skill Description</th>
<th>Check Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write and interpret numerical expressions using parentheses, brackets, or braces</td>
<td></td>
</tr>
<tr>
<td>(Add 8 and 7, then multiply by 2 is the same as 2 (8 + 7).)</td>
<td></td>
</tr>
<tr>
<td>Express a whole number between 2 and 50) as a product of its prime factors.</td>
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<tr>
<td>Describe more complex patterns by seeing and telling about the change.</td>
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<tr>
<td>Understand the place value system from thousandths to millions.</td>
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</tr>
<tr>
<td>Fluently multiply multi-digit numbers using the standard algorithm (step-by-step</td>
<td></td>
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<tr>
<td>solution to problem).</td>
<td></td>
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<tr>
<td>Divide multi-digit numbers by two-digit divisors.</td>
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<tr>
<td>Read, write, and compare decimals to the thousandths.</td>
<td></td>
</tr>
<tr>
<td>Round decimals to any place.</td>
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</tr>
<tr>
<td>Compute with multi-digit whole numbers and numbers with decimals to the hundredths.</td>
<td></td>
</tr>
<tr>
<td>Add and subtract fractions with unlike denominators.</td>
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<tr>
<td>Multiply fractions and mixed numbers.</td>
<td></td>
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<tr>
<td>Divide unit fractions by whole numbers and whole numbers by unit fractions.</td>
<td></td>
</tr>
<tr>
<td>Convert measurements and use in problem solving, for example, 0.05 m = 5 cm and</td>
<td></td>
</tr>
<tr>
<td>2.5 feet = 30 inches.</td>
<td></td>
</tr>
<tr>
<td>Organize and explain data using a line plot.</td>
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<tr>
<td>Understand and find the volume of rectangular prisms.</td>
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<tr>
<td>Analyze number patterns.</td>
<td></td>
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<tr>
<td>Graph points on a coordinate graph.</td>
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<tr>
<td>Show a graph with an x and y axis with several points labeled by their coordinates.</td>
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<tr>
<td>Sort two-dimensional shapes into categories based on their properties.</td>
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<tr>
<td>Know what makes rectangles, parallelograms, and trapezoids different.</td>
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<tr>
<td>Know the inside sum of the angles of a triangle (180 degrees) and a quadrilateral (360 degrees).</td>
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<tr>
<td>Be able to find the area of a triangle and parallelogram by knowing and understanding the formula for area of these shapes.</td>
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If your children are struggling with math, following are some ideas about what you can do to help them to gain understanding and be more successful. Although the following tips were written for students with disabilities, many of these ideas apply to any student who is struggling with challenging learning.

1. **Ask questions of school personnel.**
   - What is my child’s grade level in math? What does that mean that he/she can do?
   - What areas need improvement?
   - Are you using a specific program to teach my child? If so, what skills does this program focus on? How did you determine this math approach would meet my child’s learning style?
   - What specific kinds of things are you doing to help my child succeed in math? (for example, support by a math specialist, technology, providing different materials, teaching skills they can apply independently).
   - What can I do at home to help my child with math mastery?

2. **Gather specific information on how your child learns new information.** Ask for a learning style inventory to be completed. Talk to previous teachers about ways your child learned new information, retained the information, and demonstrated what they had learned. Ask that this information be placed in the Individualized Education Program (IEP).

3. **Consider multiple ways for your child to demonstrate what he or she knows.** A critical part of teaching and assessing students with disabilities is providing them with accommodations that support learning and that support their ability to show what they know and can do. But what accommodations are appropriate for which students, and how do those accommodations affect students’ learning and their performance on tests? The challenge for educators and families is to decide which accommodations will help students learn new skills and knowledge—and which will help them demonstrate what they’ve learned. The *Online Accommodations Bibliography* at the National Center on Educational Outcomes is a good source of information on the range of possible accommodations and the effects of various testing accommodations for students with disabilities. http://www.cehd.umn.edu/NCEO/OnlinePubs/AccommBibliography/AccomStudies.htm.

What helps one student may not address another’s needs at all. Decisions about accommodations must be made on an individualized basis, student by student, by the IEP team. Students can help inform these decisions by talking with the team about what works best for them. Involving students and parents in the process of determining goals and respecting their voices about which accommodations might best help them achieve those goals recognizes them as valued participants and can ultimately lead to feelings of increased control and responsibility in their education. For more information on this topic, see http://nichcy.org/research/ee/assessment-accommodations.

4. **Consider the need for an Assistive Technology evaluation.** Completing an Assistive Technology evaluation may provide critical information on multiple ways to engage and teach students with disabilities, as well ways for students to demonstrate competency. The only way to know what a child needs is to evaluate what factors are affecting the student. For example, one method for assessing the need for assistive technology is the SETT method (Student, Environment, Tasks, Tools), which includes questions that address which students need
assistive technology, which kinds of technology are needed, and who should make the decisions. For more information about the SETT framework, go to http://www.atto.buffalo.edu/registered/ATBasics/Foundation/Assessment/sett.php.

5. Consider the impact of the student’s disability and how it will affect mastery of math. If there could be a direct relationship, talk about the issues and solutions as part of the IEP process. It is important to look at the underlying cause of a student’s difficulties, and then choose tools, techniques, or technology for intervention. For example:

- Poor visual processing can affect how students line up numbers
- Writing difficulties may impact students’ abilities to write symbols and fractions
- Difficulties with language in determining key information can impact comprehension of math problems
- Poor recall abilities, short or long term memory deficits may affect math success
- Attention issues which impact following sequential steps may be a barrier
- Struggling readers, those below grade level in reading, and students with comprehension deficits will struggle with math. There is a significant amount of reading and comprehension required for math mastery. Address this with the Individualized Education Planning (IEP) team or your child’s teacher.
- For more information about how you can help your child in math, go to the STEP (Support and Training for Exceptional Parents) website at http://www.tnstep.org/.

6. Learn about evidence-based practices and ask that they be used to assist your child in math mastery. When it comes time to determine how to best teach math to a particular student, it is important to select an instructional intervention that supports the educational goals of the student based on age, needs, and abilities. Research findings can and do help identify effective and promising practices, but it’s essential to consider how well-matched any research actually is to your local situation and whether or not a specific practice will be useful or appropriate for a particular classroom or child. Interventions are likely to be most effective when applied to similar content, in similar settings, and with the age groups intended for them. Teachers and school staff may make the major suggestions and decisions about best practices for teaching your child, but you are your child’s best advocate and it is important for you to understand what they are suggesting and deciding for your child and to add your input to the decision making process.

7. Sample evidence-based strategies and tools. In a search of evidence-based strategies and tools from educational research organizations (see resource citations in number 8 below), we found several resources that have the following recommendations for strategies in common:

**Providing systematic and explicit instruction:** Systematic instruction focuses on teaching students how to learn by giving them the tools and techniques that efficient learners use to understand and learn new material or skills. Systematic instruction, sometimes called “strategy instruction,” refers to the strategies students learn that help them integrate new information with what is already known in a way that makes sense and be able to recall the information or skill later, even in a different situation or place. Systematic instruction is particularly helpful in strengthening essential skills such as organization and attention, and often includes:

- Memory devices, to help students remember the strategy (e.g., a first-letter mnemonic created by forming a word from the beginning letters of other words);
- Strategy steps stated in everyday language and beginning with action verbs (e.g., read the problem carefully);
- Strategy steps stated in the order in which they are to be used (e.g., students are cued to read the
word problem carefully before trying to solving the problem);
• Strategy steps that prompt students to use cognitive abilities (e.g., the critical steps needed in solving a problem). http://nichcy.org/research/ee/math.

Teaching visual representation of functions and relationships, such as manipulatives, pictures, and graphs: Visual representations (drawings, graphic representations) are used by teachers to explain and clarify problems and by students to understand and simplify problems. When used systematically, visuals have positive benefits on students’ mathematic performance. Manipulatives are objects that can help students understand abstract concepts in mathematics (may be actual blocks, coins, rods, or computer-based items), and using pictures and graphs can help children see and better understand the relationships between math concepts.

Providing peer-assisted instruction: Students with learning disabilities sometimes receive some type of peer assistance or one-on-one tutoring in areas in which they need help. The more traditional type of peer-assisted instruction is cross-age, where a student in a higher grade functions primarily as the tutor for a student in a lower grade. In the newer within-classroom approach, two students in the same grade tutor each other. In many cases, a higher performing student is strategically placed with a lower performing student but typically, both students work in both roles: tutor (provides the tutoring) and tutee (receives the tutoring).

Using ongoing, formative assessment: Formative assessment is a range of procedures employed by teachers during the learning process in order to modify teaching and learning activities to improve student attainment. Ongoing formative assessment and evaluation of students’ progress in mathematics can help teachers measure their students’ growth and helps them fine-tune their instruction to meet students’ needs.

Student “think-alouds”: The process of encouraging students to verbalize their thinking—by talking, writing, or drawing the steps they used in solving a problem—was consistently effective. http://www.nctm.org/news/content.aspx?id=8452.

Self-instruction: Self-instruction refers to a variety of self-regulation strategies that students can use to manage themselves as learners and direct their own behavior, including their attention. Learning is essentially broken down into elements that contribute to success:
• setting goals
• keeping on task
• checking your work as you go
• remembering to use a specific strategy
• monitoring your own progress
• being alert to confusion or distraction and taking corrective action
• checking your answer to make sure it makes sense and that the math calculations were computed correctly.

When students discuss the nature of learning in this way, they develop both a detailed picture of themselves as learners (known as metacognitive awareness) and the self-regulation skills that good learners use to manage and take charge of the learning process.

8. Other sources of information. To better understand the evidence base for math and other educational interventions, use these sources of information:
• What Works Clearinghouse http://ies.ed.gov/ncee/wwc/
• Best Evidence Encyclopedia (BEE) http://www.bestevidence.org
• Center on Instruction http://www.centeroninstruction.org/index.cfm
Sources Used in the Creation of This Document


- Online Accommodations Bibliography at http://www.cehd.umn.edu/NCEO/OnlinePubs/AccommBibliography/AccomStudies.htm.


- http://mathisfun.com


- Fifth Grade Flip Book Compiled by Melisa J. Hancock, melisa@ksu.edu


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