



William Floyd Union Free School District

A Parent's Math Resource Guide to 2nd Grade Mathematics





Dear Parents,

The Parent's Math Resource Guide is a resource to assist you in becoming familiar with Common Core Mathematics Standards for 2nd Grade.

This resource guide includes:

1. An overview of Mathematical Practices for 2nd Grade
2. Parent's Backpack Guide to Common Core Standards
3. How 2nd Grade fits in the Mathematical Progression
4. Partnering with your child's teacher
5. 2nd Grade Math Glossary
6. 2nd Grade Math Strategies
7. Addition stages and strategies
8. Subtraction stages and strategies
9. Resources for 2nd Graders and their families.

If you have any questions regarding anything within this resource guide, please contact our classroom teacher.

An Overview of 2nd Grade Math

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

1. Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multidigit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

2. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

3. Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

4. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Mathematical Practices

These eight practices are the goals of all math education, K-12

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Big Ideas in Grade 2

Operations and Algebraic Thinking

- Represent and solve problems involving addition and subtraction.
- Add and subtract within 20.
- Work with equal groups of objects to gain foundations for multiplication.

Number and Operations in Base Ten

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

Measurement and Data

- Measure and estimate lengths in standard units.
- Relate addition and subtraction to length.
- Work with time and money.
- Represent and interpret data.

Geometry

- Reason with shapes and their attributes.

Parent's Backpack Guide to Common Core State Standards (from engageny.org)

The chart below shows what is shifting, what you might see in your child's backpack and what you can do to help your child. Again, if your child's assignments do not reflect the shifts, then talk to our child's teacher.

What's Shifting?	What to Look for in the Backpack?	What Can You Do?
<ul style="list-style-type: none"> • Your child <u>will work more deeply in fewer topics</u>, which will ensure full understanding (less is more!). 	<ul style="list-style-type: none"> • Look for assignments that require students to show their work and explain how they arrived at an answer. 	<ul style="list-style-type: none"> • Know what concepts are important for your child based on their grade level and spend time working on these concepts.
<ul style="list-style-type: none"> • Your child will <u>keep building on learning year after year</u>, starting with a strong foundation. 	<ul style="list-style-type: none"> • Look for assignments that build on one another. For example, students will focus on adding, subtracting, multiplying and dividing. Once these areas are mastered, they will focus on fractions. Building on that, they will then focus on Algebra. You should be able to see the progression in the topics they learn. 	<ul style="list-style-type: none"> • Be aware of what concepts your child struggled with last year and support your child in those challenge areas moving forward.
<ul style="list-style-type: none"> • Your child will <u>spend time practicing and memorizing math facts</u>. 	<ul style="list-style-type: none"> • Look for assignments that ask your child to master math facts such as addition groupings up to 20 or multiplication tables. 	<ul style="list-style-type: none"> • Help your child know and memorize basic math facts. Ask your child to "do the math" that pops up in daily life.
<ul style="list-style-type: none"> • Your child will <u>understand why the math works and be asked to talk about and prove their understanding</u>. 	<ul style="list-style-type: none"> • Your child might have assignments that ask her or him to show or explain their mathematical thinking — to SAY why they think their answer is the right one. 	<ul style="list-style-type: none"> • Talk to your child about their math homework and ask them to teach you new concepts. Help them figure out ways to explain their thinking.
<ul style="list-style-type: none"> • Your child will not be asked to <u>use math in real-world situations</u>. 	<ul style="list-style-type: none"> • Look for math assignments that are based on the real world. For instance, homework for 5th graders might include adding fractions as part of a dessert recipe or determining how much pizza friends ate based on fractions. 	<ul style="list-style-type: none"> • Provide time every day for your child to work on math at home.

How 2nd Grade “Fits” in the Progression

(taken from Parent Roadmap: Supporting Your Child in Grade One Mathematics)

In grade two, students will extend their understanding of place value to the hundreds place. They will use this place value understanding to solve word problems, including those involving length and other units of measure. Students will continue to work on their addition and subtraction skills, quickly and accurately adding and subtracting numbers up through 20 and also working with numbers up through 100. They will also build a foundation for understanding fractions by working with shapes and geometry. Activities in these areas will include: quickly and accurately adding numbers together that total up to 20 or less or subtracting from numbers up through 20; solving one- or two-step word problems by adding or subtracting numbers up through 100; understanding what the different digits mean in a three-digit number; adding and subtracting three digit numbers; measuring lengths of objects in standard units such as inches and centimeters; solving addition and subtraction word problems involving length; solving problems involving money; breaking up a rectangle into same -size squares; dividing circles and rectangles into halves, thirds, or fourths; solving addition, subtraction, and comparison word problems using information presented in a bar graph writing equations to represent addition of equal numbers.

Here are just a few examples of the skills and strategies students will develop as they solve word problems in grade two.

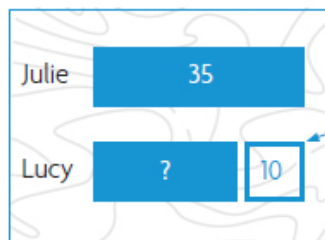
Grade One Mathematics	Grade Two Mathematics	Grade Three Mathematics
Solve word problems by adding or subtracting numbers up through 20	Solve one- and two-step word problems by adding or subtracting numbers up through 100	Solve two-step word problems by adding, subtracting, multiplying, or dividing numbers up through 100

Students in grade two will use diagrams such as this one to think through and solve one- and two-step word problems.

Julie has 35 books. Julie has 10 more books than Lucy. How many books does Lucy have? How many books do they have together?

Step 1: If Lucy has 10 less books than Julie, students first need to figure out what 10 less than 35 is.

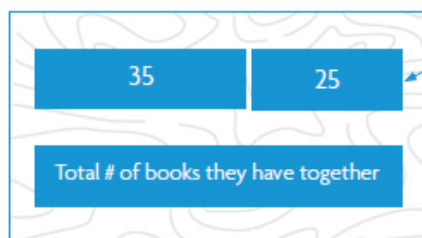
$$35 \text{ books} - 10 \text{ books} = 25 \text{ books}$$



$$25 + 10 = 35$$
$$35 - 10 = 25$$

Step 2: Students then have to add the number of books Julie has to the number of books Lucy has.

$$35 \text{ books} + 25 \text{ books} = 60 \text{ books}$$



$$35 + 25 = 60$$

Partnering with your Child's Teacher

(taken from Parent Roadmap)

Don't be afraid to reach out to your child's teacher—you are an important part of your child's education. Ask to see a sample of your child's work or bring a sample with you. Ask the teacher questions like:

- Is my child at the level where he/she should be at this point of the school year?
- Where is my child excelling? How can I support this success?
- What do you think is giving my child the most trouble? How can I help my child improve in this area?
- What can I do to help my child with upcoming work?

Here are just a few examples of how students will develop and use their understanding of place value in grade two.

Grade One Mathematics	Grade Two Mathematics	Grade Three Mathematics
<ul style="list-style-type: none">• Understand that 10 can be thought of as a bundle of ten ones—called a "ten"• Understand that the two digits of a two-digit number represent amounts of tens and ones (place value)• Add and subtract numbers through 100 using what students have learned about place value	<ul style="list-style-type: none">• Understand that 100 can be thought of as a bundle of ten tens—called a "hundred"• Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones (place value)• Add and subtract numbers through 1000 using what students have learned about place value	<ul style="list-style-type: none">• Use place value understanding to round whole numbers to the nearest 10 or 100• Quickly and accurately add and subtract numbers through 1000• Use place value understanding to multiply and divide numbers up through 100• Multiply one-digit whole numbers by multiples of 10 between 10 and 90. For example, 9×80 or 5×60

Students learn that $250 = 2$ hundreds and 5 tens, 25 tens, or 250 ones.

$$\boxed{250} = \boxed{2} + \boxed{5} + \boxed{0}$$

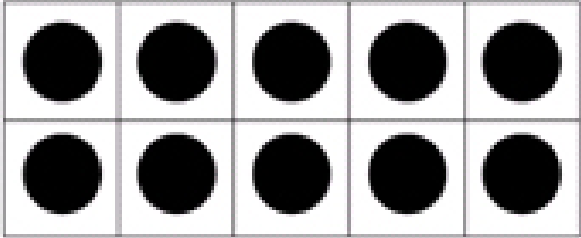
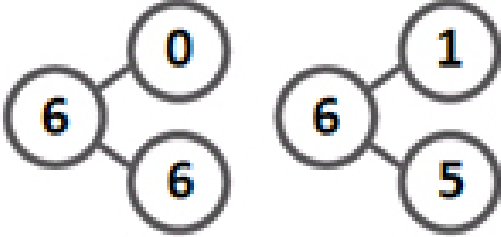
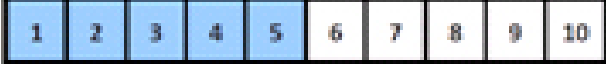
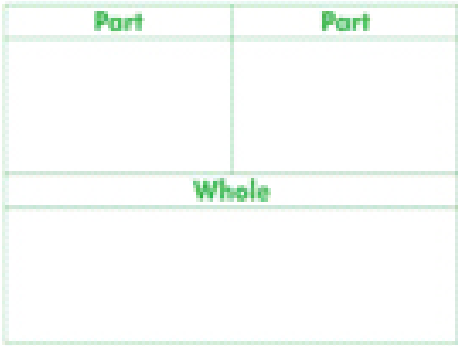
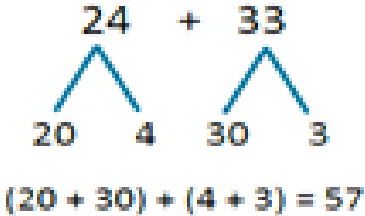
hundreds tens ones

Students apply their understanding that 5 tens + 5 tens = 10 tens, or 1 hundred, that can then be added to the hundreds place.



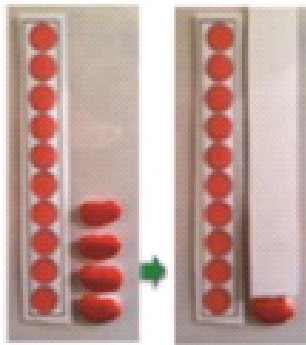

$$\boxed{2} \boxed{5} \boxed{0} + \boxed{2} \boxed{5} \boxed{3} = \boxed{5} \boxed{0} \boxed{3}$$

hundreds tens ones hundreds tens ones hundreds tens ones

Glossary for 2nd Grade Math

<p>Tens Frame</p>	<p>A 2x5 grid used for combinations to 10 and adding and subtracting within 20</p>	
<p>Number Bond</p>	<p>A representation of two smaller parts that make up a whole.</p> <p>For example, 6 is made up of 0 and 6 or 6 is made up of 1 and 5</p>	
<p>Number Path</p>	<p>Foundation for understanding a number line – 1 number, 1 space Counting and matching numbers and objects</p>	
<p>Part-Part Total Part- Part Whole</p>	<p>A way to show the two smaller parts that make up a whole (similar to a number bond, different visual representation)</p>	
<p>Partial Sums</p>	<p>A way to add numbers by adding each place and combining</p>	

Glossary for 2nd Grade Math, cont.

<p>Tape Diagram</p>	<p>The tape diagram provides an essential bridge to algebra and is often called "pictorial algebra." They are <u>pictorial</u> representations of relationships between quantities used to solve word problems.</p>	 <p>Rachel collected 58 seashells. Sam gave her 175 more. How many seashells did she have then?</p>
<p>Partial Differences</p>	<p>A way to subtract multi-digit numbers by their value.</p>	<p>$34 - 17 = 34 - 10 = 24$ $24 - 7 = 17$</p> <p>Break up the 17 into 10 and 7. Begin with the 34 and subtract the 10 and then the 7.</p>
<p>Number Line</p>	<p>The number line is used to develop a deeper understanding of whole number units. Using a number line, starting at any point, to add or subtract</p>	<p>$3 + 1 = 4$</p> 
<p>Decompose</p>	<p>Breaking a number down into smaller parts</p>	 <p>$14 - 3 = 11$</p> <p>10 4</p> <p>Subtract 3 from 4</p> <p>$4 - 3 = 1$ $10 + 1 = 11$ $14 - 3 = 11$</p>
<p>Place Value Sketch</p>	<p>A way to represent an addition or subtraction problem using a sketch of place value blocks</p>	<p>$23 + 14 =$</p> 

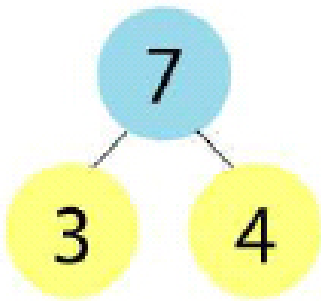
Addition Stages and Strategies

Stages of Addition

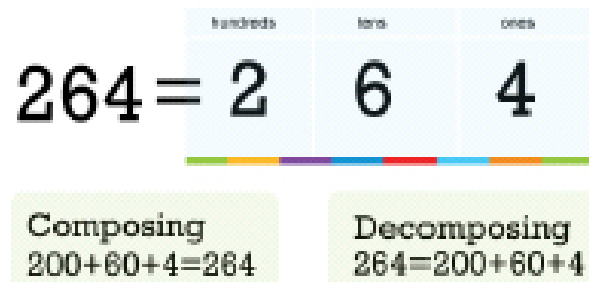
(taken and adapted from Why Before How: Singapore Math Computation Strategies by Jana Hazekamp)

It is important to encourage your students to use a variety of computation strategies. Guide your students to notice what is the same and different about these methods. Begin with the concrete, move on to pictorial representations, and with the abstract. You can do this by teaching the concept of addition in the following sequence: 1) Number bonds, 2) Decomposing numbers, 3) Left-to-right addition, 4) Place value disks and charts, 5) Vertical addition, and 6) Traditional addition.

Number Bonds help students see that numbers can be "broken" into pieces to make computation easier.



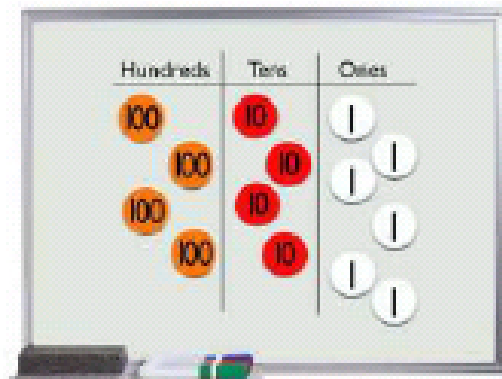
Decomposing Numbers encourages students to think about place value, and students' awareness of place value will be key to later success with mental math and other computation methods.



Left-to-Right Addition emphasizes place value. Decomposing is an important prerequisite.

$$\begin{array}{r} 34 + 45 \\ (30 + 40) + (4 + 5) \\ 70 + 9 \end{array}$$

Place Value Disks and Charts help move students toward understanding the traditional algorithm, and help students



Vertical Addition is similar to left-to-right, except that it is vertical instead of horizontal. This is also known as partial sums.

$$\begin{array}{r} 59 \\ +37 \\ \hline 80 \\ \hline 16 \\ \hline 96 \end{array}$$

Traditional Addition is the final addition strategy that students learn. It is important that it is connected to other methods when it is taught.

$$\begin{array}{r} 1 \\ 59 \\ +37 \\ \hline 96 \end{array}$$

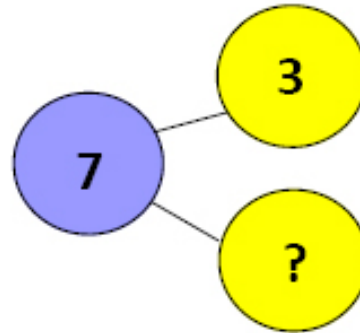
Subtraction Stages and Strategies

It is important to help our students understand the concept of subtraction first, before bombarding them with abstract rules. Students can build an understanding of subtraction by sharing stories in which they have subtracted. They need to begin with the concrete, move on to pictorial representations, and then move to the abstract.

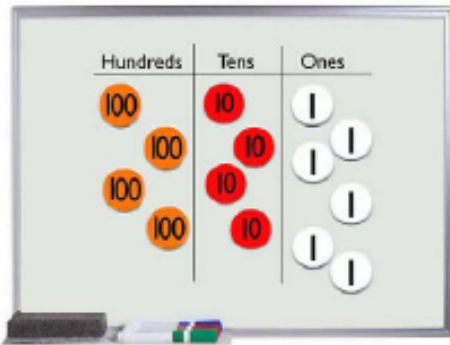
Pictorial Representations help students see that subtraction involves taking away.



Number Bonds help students see that numbers can be "broken" into pieces to make computation easier.

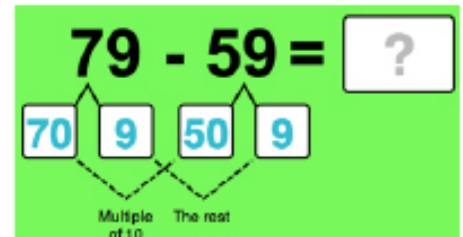


Place Value Disks and Charts help move students toward understanding the traditional algorithm, and help students understand when to regroup.



Partial Differences reinforces place value. Students can be taught to subtract the tens place first, or the ones place.

$$\begin{array}{r} 52 \\ - 37 \\ \hline 50 \\ - 30 \\ \hline 20 \\ - 5 \\ \hline 15 \end{array}$$



Traditional Subtraction is the final addition strategy that students learn. It is important that it is connected to other methods when it is taught.

$$\begin{array}{r} 41 \\ \cancel{5}2 \\ - 37 \\ \hline 15 \end{array}$$

Compensation involves adding or subtracting the same number to the minuend as the subtrahend, making it easier to solve.

$$\begin{array}{r} 52 + 2 = 54 \\ - 28 + 2 \quad - 30 \\ \hline 24 \end{array}$$

Addition and Subtraction Strategies

Addition Examples:

There are 178 fourth graders and 225 fifth graders on the playground. What is the total number of students on the playground?

Student 1

$$100 + 200 = 300$$

$$70 + 20 = 90$$

$$8 + 5 = 13$$

$$300 + 90 + 13 =$$

403 students

Student 2

I added 2 to 178 to get 180. I added 220 to get 400. I added the 3 left over to get 403.

Student 3

I know the 75 plus 25 equals 100. I then added

1 hundred from 178 and

2 hundreds from 275. I had a total of 4 hundreds and I had 3 more left to add. So I have 4 hundreds plus 3 more which is 403.

Student 4

$$178 + 225 = ?$$

$$178 + 200 = 378$$

$$378 + 20 = 398$$

$$398 + 5 = 403$$

Addition strategies based on place value for $48 + 37$ may include:

- Adding by place value: $40 + 30 = 70$ and $8 + 7 = 15$ and $70 + 15 = 85$.
- Incremental adding (breaking one number into tens and ones); $48 + 10 = 58$, $58 + 10 = 68$, $68 + 10 = 78$, $78 + 7 = 85$
- Compensation (making a friendly number): $48 + 2 = 50$, $37 - 2 = 35$, $50 + 35 = 85$

Subtraction strategies based on place value for $81 - 37$ may include:

- Adding up (from smaller number to larger number): $37 + 3 = 40$, $40 + 40 = 80$, $80 + 1 = 81$, and $3 + 40 + 1 = 44$.
- Incremental subtracting: $81 - 10 = 71$, $71 - 10 = 61$, $61 - 10 = 51$, $51 - 7 = 44$
- Subtracting by place value: $81 - 30 = 51$, $51 - 7 = 44$

Properties that students should know and use are:

- Commutative property of addition (Example: $3 + 5 = 5 + 3$)
- Associative property of addition (Example: $(2 + 7) + 3 = 2 + (7 + 3)$)
- Identity property of 0 (Example: $8 + 0 = 8$)

The next three and a half pages were taken from the East Irondequoit website. They include a variety of addition and subtraction strategies that are first introduced to students in K-2 with smaller numbers, and are then extended into the upper elementary grades with bigger numbers. The “traditional” algorithm for addition and subtraction are introduced in 4th grade. We no longer use the terms borrowing and carrying, we actually haven’t used them for years. The proper term is regrouping.

More Addition Strategies

Strategies for Addition

1. Breaking Apart (Place Value), also known as "Separating" or "Decomposing"

Break both numbers down to place value and add each, starting with the largest:

$$46 + 25 =$$

46 breaks into 40 plus 6 ($40 + 6$), 25 breaks into 20 plus 5 ($20 + 5$)

$$40 + 20 = 60$$

$$6 + 5 = 11$$

$$60 + 11 = 71$$

Or:

Keep one number intact and only break second number down by place value and adding each place:

$$46 + 25 =$$

46 stays intact and 25 breaks into 20 and 5

$$46 + 20 = 66$$

$$66 + 5 = 71 \text{ or } *66 + (4 + 1)$$

*Note: some students may prefer to break the 5 apart ($4 + 1$) so that they can add 4 to 66 and get 70, then add on 1. It would only make sense to break down the ones to get to the "landmark" number 10.

2. Compensation:

Round one or more of the numbers to numbers that are easier to work with, then compensate:

$$256 + 687$$

$$\begin{array}{r} \boxed{+13} \\ 256 + 700 = 956 \\ 956 - \boxed{+13} = \\ \text{(decompose 13)} \\ 956 - 10 = 946 \\ 946 - 3 = 943 \end{array}$$



13 is added to **687** to get **700**, an easier number to work with - keeping track of the adjustment is critical to making this strategy work, encourage students to box the adjustment (here we box the adjustment as - 13 since 13 was added, **now 13 must be subtracted** out of the computation to get the final answer.

3. Transformation:

Transform the problem into an equivalent problem that is easier: (like compensation, this is a strategy more advanced math thinkers can handle, you're adding to one and taking away the same amount from the other)

a. $46 + 28 = \underline{\quad}$

adding 2 to 28 makes it 30, an easy number to work with but if 2 is added into this equation, then 2 must be subtracted from the 46.

$$28 + 2 = 30$$

$$46 - 2 = 44$$

$$30 + 44 = 74$$

b. $256 + 687 =$

add 13 to 687 to make it 700, subtract 13 from 256 to make it 243, $700 + 243 = 943$

More Subtraction Strategies

1 Breaking Apart/Separating:

Subtract one number in parts from the other number which stays intact, always starting with largest place value to subtract .

a. $54 - 23 =$

23 can be broken into $20 + 3$

$$54 - 20 = 34$$

$$34 - 3 = 31$$

or $56 - 29 =$

29 can be broken into $20 + 6 + 3$, breaking 9 into $6 + 3$ makes it easier to subtract

$$56 - 20 = 36$$

$$36 - 6 = 30$$

$$30 - 3 = 27$$

b. $547 - 297 =$

keep 547 intact, break 297 into $200 + 90 + 7$, subtract out one place value at a time

$$547 - 200 = 347$$

$$347 - 90 = 257$$

$$257 - 7 = 250$$

or $547 - 297 = \underline{\quad}$, break 297 into $247 + 50$, subtract out each part

$$547 - 247 = 300, 300 - 50 = 250$$

2. Adding Up/Counting On:

Start with smaller number, add up to a landmark number*, from the landmark add up to get to the target number. Add the two numbers you used.

$$212 - 197 =$$

$$197 \boxed{+3} = 200^*$$

$$200 \boxed{+12} = 212$$

$$3 + 12 = 15$$

$$516 - 305 =$$

$$305 + \boxed{195} = 500^*$$

$$500 + \boxed{16} = 516$$

$$195 + 16 = 211 \text{ (} 195 + 10 = 205, 205 + 6 = 211 \text{)}$$

3. Subtracting across the zeros:

Adding up is a good strategy when one of the subtrahends involves 0's. Students have a great deal of difficulty subtracting across the zeros.

$$\$10.00 - \$4.75 =$$

$$\text{Think: } \$4.75 + \$0.25 = \$5.00$$

$$\$5.00 + \$5.00 = \$10.00$$

$$\$5.00 + \$0.25 = \$5.25$$

4. Subtracting from 9's:

Given $1,000 - 273$:

(subtract 1 from 1,000 making it 999 – subtracting from 9's doesn't require any regrouping)

$$999 \boxed{+1} \text{ box the adjustment to remember to add it back in}$$

$$\begin{array}{r} -273 \\ 999 \\ \hline 726 \end{array} \boxed{+1} \text{ now add back the 1, the answer is 727}$$

Given $1006 - 273$:

(subtract 7 from 1006 making it 999,

$$\begin{array}{r} 999 \boxed{+7} \\ -273 \\ \hline 726 \end{array} \boxed{+7} \text{ now add back the 7 making the answer 733}$$

3. Transformation

Transform the entire problem to an equivalent problem that is easier to solve by adding or subtracting the same number from/to both numbers in the subtraction problem. (Using the same number maintains the difference between the two numbers.) The goal of adding or subtracting a number is to make one or more of the numbers easier to work with.

$$547 - 297 =$$

add 3 to both numbers to bring 297 to 300 and 547 to 550, now 300 is an easier number to subtract from 550

$$550 - 300 = 250$$

4. Compensation:

Adjust one of the numbers in a math problem in order to make them easier to work with.

a. $45 - 27 =$

$$27 - \boxed{2} = 25$$

$$45 - 25 = 20$$

$$20 - \boxed{2} = 18$$



You ignored 2 out of the 27 so you need to subtract 2 out of the answer.

b. $45 - 27 =$

$$45 + \boxed{2} = 47$$

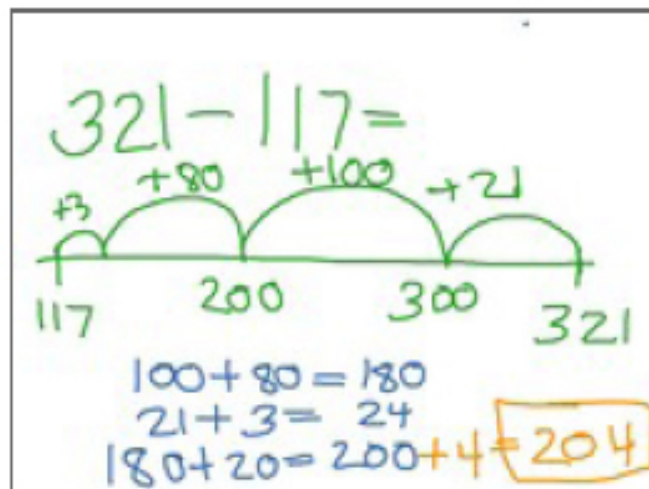
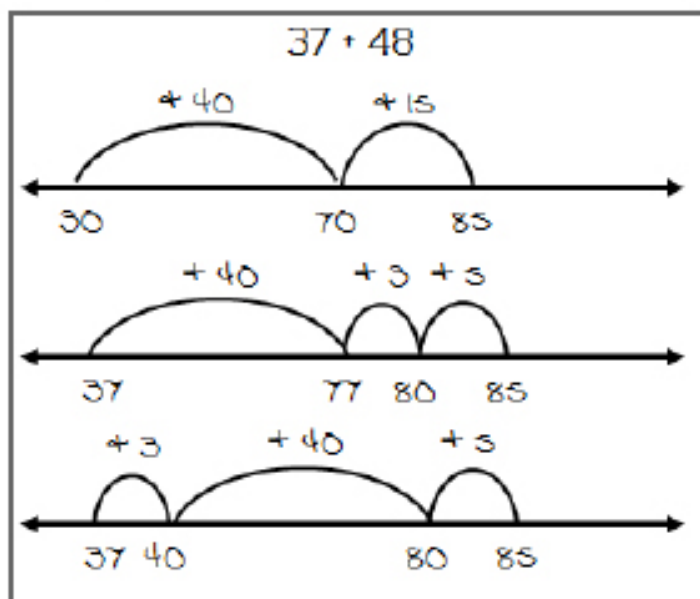
$$47 - 27 = 20$$

$$20 - \boxed{2} = 18$$



You added 2 to 45 so you need to subtract 2 out of the answer.

Open or Numberless Number Line (A strategy for addition or subtraction.)



There are several ways to use an open number line for both addition and subtraction.

Websites for Parents

For more information on the Common Core State Standards for mathematics, go to www.corestandards.org/about-the-standards/key-points-in-mathematics or www.commoncoreworks.org.

For more information on the standards in mathematics related to place value (Number and Operations in Base Ten) or fractions, go to commoncoretools.me/category/progressions/.

For more information on helping your child learn mathematics (with activities from pre-school to grade five), go to www2.ed.gov/parents/academic/help/math/index.html.

For the full text of the Common Core Learning Standards go to:
www.p12.nysed.gov/ciai/common_core_standards/pdfdocs/nysp12cclsmath.pdf

Additional websites:

www.EngageNY.org

illuminations.nctm.org

www.pbs.org/parents/earlymath/

Websites for 2nd Graders

www.xtramath.org

www.multiplication.com/games

www.ictgames.com/

www.eduplace.com/math/mthexp

www.aplusmath.com/

www.aaamath.com/

mathforum.org/dr.math/

www.coolmath4kids.com/

www.funbrain.com/

www.mathstories.com/

www.teachrkids.com/

www.eduplace.com/math/brain/index.html

www.mathplayground.com/wordproblems.html

Teacher Recommended Free Apps for 2nd Graders

FlashToPass Free Math Flash Cards

Sushi Monster

2nd Grade Math: Splash Math Worksheets Game for kids Lite

Numbers, Addition and Subtraction!

Math Facts Flashcards- Fun Mathematics Flashcards

Teacher Recommended Apps (Under \$3.00) for 2nd Graders

AB Math \$1.99

2nd Grade Math Common Core – Addition, Subtraction, Shapes, Time... \$2.99

Math Bingo \$0.99

TeachMe: 2nd Grade \$1.99

Resources Used in this Publication

East Irondequoit, NY CSD, www.eastiron.org, Parent Center Link on Left

EngageNY, www.engageny.org

Hudsonville, MI CSD Parent Presentation, www.hudsonville.k12.mi.us

Kansas Association of Teachers of Mathematics (KATM) Flip Books, www.katm.org

New York State Education Department, Common Core Learning Standards for Mathematics, K-12

Parent Roadmap: Supporting Your Child in Grade Two Mathematics, Council of the Great City

Schools, Washington, D.C.; www.cgcs.org