

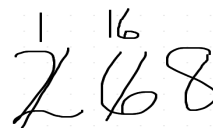
GRADE 3 - TOPIC 8 - USE STRATEGIES AND PROPERTIES TO ADD AND SUBTRACT

Tools	Models	Strategies
Place Value Tools - Place value chart (printed) - Place value discs - Place value blocks Number Bead Strings - Rekenrek - Money: \$100, \$10 and \$1 bills - Snap/Unifix cubes	Pictorials: - base-tens - place value discs Open Number Line Diagram Number Bonds Bar Model	Estimation Counting on (Level 2) Stacking (Lining by Like Units) Partial sums by place value Partial differences by place value Regrouping Making Ten (Level 3) Decomposing addends by place value Properties of Operation: - Commutative Property - Associative Property - Identify Property - Zero Property
Do		Don't
Lesson 1: Addition Properties - Prior to the start of the unit gather formative assessment on what students can do and understand about adding and subtracting. - Have students prove the Commutative and Associative Properties with concrete tools (e.g., base ten blocks, number bead strings) - Model ideas consistently, not as a crutch, but as a tool of proof. - Have students consistently use precise math terms (addends, sum) - Present problems where it benefits us to apply specific properties of operations. - Bring up the idea of decomposing addends, e.g., #18 on pg. 407 has: $34 + (2 + 28) = (2 + 28) + 34$ - They should also name the property being applied and explain why - They should also discuss what if the parenthesis were not present and they say $34 + 2 + 28$ what would they do and why. - They can also see this expression as $30 + 20 + 2 + 8$...we are then decomposing the addends and applying the Associative Property and the Commutative Property of Addition.		Don't teach the traditional algorithm. - Convey that manipulatives are for struggling students.

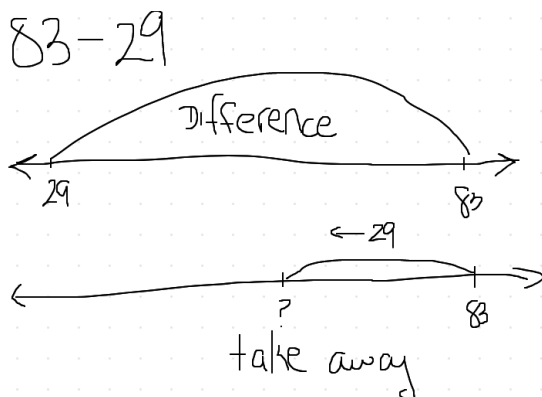
Lesson 2: Algebra - Addition Patterns Model relationships with concrete objects.	- Not sure if I would do this lesson. This could be an ongoing center. - This lesson could go very deep into number theory, but it does not. It takes a cursory look at patterns on the number grid. They gloss over the structure and patterns too quickly and I wonder about its relevance to the unit as a whole. Suggestion: Pick one pattern, e.g., sums of consecutive numbers, pg. 411, and focus on that and let the students discover the pattern.
Lesson 3: Round Whole Numbers - Would save this lesson for the end of unit. Disrupts the flow without reason. - Use number bead strings and connect to the open number line. - See: Rounding 234 - Use the terms range, midpoint.	Teach a song or other trick. The midpoint is no closer to either end of the range. Rounding up once we are at the midpoint is a mathematical convention.
Lesson 4: Mental Math: Addition - Focus on how we can decompose numbers, when it is beneficial and why. - Model ways numbers are decomposed using number bonds and on open number lines. - Model how numbers can be decomposed and recomposed with base ten blocks. - Every student should be able to use decomposing by place value. - Students need to model and explain thinking as they work.	Assume that just because a student can get an answer that they understand what they have done...they have to talk to explain thinking.
Lesson 5: Mental Math: Subtraction - Contextualize (realistic or imaginable) situations. - Ask students to study the problem and see what they could do. See example on pg. 429A. Ask if other ways are possible. - Ask students to discuss and act out the problems with each other using different tools or models. - Must do Mental Math (verbally) before committing to paper. - Make into a game.	- Say that you are doing mental math, when you work it out on paper first. - The traditional algorithm in your head.
Lesson 6: Estimate Sums - Might need to do the rounding lesson prior to this one if students have not had exposure to estimation, but it might just confuse your students when they can estimate. Rounding is a specific way to estimate. - Estimation is a tool used to help us in figuring out if our sums and differences are accurate. - Continue to use mental math. - Discuss within context determine what estimate makes sense and why. When is it useful to get a low estimate opposed to going for a higher estimate? - Make these activities into a game.	- Confuse rounding with estimation. - Use rounding, instead use estimation. Rounding is specific and has a specific process and structure. Rounding is a form of estimation. General estimation just asks the user to get a number that is close to the number being estimated.

• Use tools, such as number beads, to model thinking. • Use math models, such as the open number line, to show thinking.	
Lesson 7: Estimate Differences • See above. • Discuss the differences between good estimates and not-so-good estimates and why. Use a context.	
Lesson 8: Relate Addition and Subtraction • Use the bar model and/or number bond to highlight the relationships. • Let students discover the relationship and explain why this is a useful relationship to understand. • Connect back to Grade 1 work with Fact Families.	• Encourage students to use the inverse operation to check their addition or subtraction. Students generally just try to get back to the same answer that they got in the beginning. They should use a different model to confirm their work. • Take too much time on this lesson. It is a strategy, not the only way.
Lesson 9: Math Practices and Problem Solving: Model with Math • Use all tools mentioned previously. • Present different problem type situations: ○ CCSS Problem Types Chart ○ "Take from" Common Core Problem Types. Looking at Result Unknown, Change Unknown and Start Unknown ○ "Add to" Common Core Problem Types. Looking at Result Unknown, Change Unknown and Start Unknown ○ "Put Together/Take Apart" Common Core Problem Types. Looking at Total Unknown, Addend Unknown and Both Addends Unknown	• Don't use key-words. They are not useful in the long run and does not support comprehension and promotes an answer-getting mindset.
Review and Topic 8 Test	

GRADE 3 - TOPIC 9 - FLUENTLY ADD AND SUBTRACT WITHIN 1,000

Tools	Models	Strategies
Place Value Tools - Place value chart (printed) - Place value discs - Place value blocks - Number Bead Strings - Rekenrek - Money: \$100, \$10 and \$1 bills - Snap/Unifix cubes	Pictorials: - base-tens - place value discs Open Number Line Diagram Number Bonds Bar Model	Estimation Counting on (Level 2) Stacking (Lining by Like Units) Partial sums by place value Partial differences by place value Regrouping Making Ten (Level 3) Decomposing addends by place value Decompose addends Equivalent Forms: - Expanded form by place value: $34 = 30 + 4$ - Unit form: 34 is 3 tens 4 ones - Regrouped: 268 is $100 + 160 + 8$  Properties of Operation: - Commutative Property - Associative Property - Identify Property - Zero Property Compensation: - Constant difference
Do		Don't
Lesson 1: Use Partial Sums to Add - Use tools (base-ten blocks, number bead string, money, place value chart with place value discs) - Use models (pictorial base-ten blocks, place value discs, etc.), number bonds - Develop an organized system for indicating when pictorials are regrouped, model regrouping notation - Use equivalent forms: Expanded form, unit form		Don't teach the standard algorithm - Don't abandon mental math strategies and properties of operation strategies during this unit. Do the mental math, explain thinking then prove with tools, models and computation strategies

Unit Form, Decomposing by Place Value 592 + 128 = 5 hundreds 9 tens 2 ones + 1 hundreds 2 tens 8 ones 6 hundreds 11 tens 10 ones 600 + 100 + 10 + 10 = 720 Partial Sums, Decomposing 592 + 128 = 500 + 90 + 2 + 100 + 20 + 8 600 + 110 + 10 600 + 120 = 720 • Use a Rally Coach or Pairs Compare strategy to support and encourage student verbalization and the use of precise math language. • Use a Find and Fix My Error strategy. • Have students explain their thinking to each other.	
Lesson 2: Add 3-Digit Numbers • See above. • Show on the open number line diagram and relate to the other ways. • Watch: Gfletchy Addition and Subtraction Progression Video • Use Convince Myself, Convince Another, Convince a Skeptic	• Don't teach the standard algorithm
Lesson 3: Continue to Add 3-Digit Numbers • Use this lesson not to teach the standard algorithm, but to deepen student number sense and use of applying the properties of operations by decomposing numbers. • Relate different ways to each other. • Play games while making sure that students are using precise mathematical language. • Focus on the word problems and understanding them.	
Lesson 4: Add 3 or More Numbers • See above. • Make into a practice center. • Use various tools and models. • Students must explain thinking to each other.	
Lesson 5: Use Partial Difference to Subtract • Use tools (base-ten blocks, number bead string, money, place value chart with place value discs) • Be on the hunt/look out for students who always want to just use the digit with the larger value in a place to subtract. For example, in the problem 61 - 29 the student would get 88. Estimation can help with this issue, but so can partial differences...they would get 40 - 8 to get 32. • Use models (pictorial base-ten blocks, place value discs, etc.), number bonds • Develop an organized system for indicating when pictorials are regrouped, model regrouping notation • Ensure that students understand in subtraction you begin with the total amount (take-away) or you are comparing 2 quantities (difference). The models will look different.	



- Use equivalent forms: Expanded form, unit form

Unit Form, Decomposing by Place Value

$$592 - 128 =$$

5 hundreds 9 tens 2 ones
 5 hundreds 8 tens 12 ones
~~- 1 hundreds 2 tens 8 ones~~

4 hundreds 6 tens 4 ones

$$400 + 60 + 4 = 464$$

Partial Differences, Decomposing by Place Value, Regrouping

$$592 - 128 =$$

$500 + 90 + 2$
 $500 + 80 + 12$
 ~~$- 100 + 20 + 8$~~

$$400 + 60 + 4 = 464$$

- Use a Rally Coach or Pairs Compare strategy to support and encourage student verbalization and the use of precise math language.
- Use a Find and Fix My Error strategy.
- Have students explain their thinking to each other.

Lesson 6: Subtract 3-Digit Numbers

- Show on the open number line diagram and relate to the other ways.
- Watch: [Gfletchy Addition and Subtraction Progression Video](#)
- Use Convince Myself, Convince Another, Convince a Skeptic
- Introduce constant difference: $61 - 29 = (61 - 2) - (29 - 2) = 59 - 27$
 - Show on a number line to prove that the difference is maintained, yet no regrouping is involved.

Lesson 7: Continue to Subtract 3-Digit Numbers

- See above.
- Use this lesson not to teach the standard algorithm, but to deepen students' number sense and use of applying the properties of operations by decomposing numbers.
- Relate different ways to each other.
- Play games while making sure that students are using precise mathematical language.
- Focus on the word problems and understanding them.

Lesson 8: Math Practices and Problem Solving - Construct Arguments

- Weave these problems in during the unit.
- Allow more time to grasp concepts.

Review and Topic 9 Test