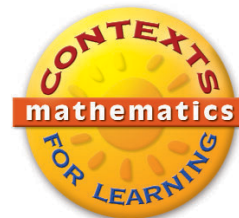


Investigating Number Sense, Addition, and Subtraction

CONTENTS FOR GRADES K–3



Investigating Number Sense, Addition, and Subtraction (Grades K–3) is organized around 8 units. Each unit comprises a two-week (10-day) sequence of investigations, games, routines, and minilessons.

1 **Bunk Beds and Apple Boxes: Early Number Sense**

BY CATHERINE TWOMEY FOSNOT

☀ **DAY ONE: BUNK BEDS**

The context of a sleepover party and the introduction of the arithmetic rack highlight the big ideas of compensation and equivalence.

☀ **DAY TWO: BUNK BEDS**

A math congress gives children a chance to share and discuss their work from Day One.

☀ **DAY THREE: BUNK BEDS**

Quick images with the arithmetic rack support the use of the five-structure in determining amounts. Children then create their own sleepover stories.

☀ **DAY FOUR: BUNK BEDS**

The game of Up and Down the Ladder revisits the big ideas of compensation and equivalence and supports the development of equations.

☀ **DAY FIVE: APPLE BOXES**

The context of a box of five apples provides another opportunity to investigate equivalence. A subsequent math congress gives children a chance to discuss their findings.

☀ **DAY SIX: APPLE BOXES**

An investigation of a bigger box of ten apples and the subsequent math congress focus on the pattern of exchange and working more systematically.

☀ **DAY SEVEN: APPLE BOXES**

Investigations of different size apple boxes challenge children to generalize and notice patterns.

☀ **DAY EIGHT: APPLE BOXES**

Preparations for a math congress give children a chance to reflect and comment on each other's work.

☀ **DAY NINE: APPLE BOXES**

A culminating math congress highlights children's developing number sense.

☀ **DAY TEN: PART-WHOLE BINGO**

The game of Part-Whole Bingo offers another opportunity to explore arrangements and equivalence.

☀ **REFLECTIONS ON THE UNIT**

2 Beads and Shoes, Making Twos: Extending Number Sense

BY MADELINE CHANG AND CATHERINE TWOMEY FOSNOT

☀ DAY ONE: WALKING IN LINE

The context of walking hand in hand in two lines supports children’s initial investigation of doubles. A math congress gives children a chance to share and discuss their work.

☀ DAY TWO: RECORDING DOUBLES ON THE NUMBER LINE

A minilesson supports children in automatizing doubles and using doubles to solve near-doubles problems. The open number line model is introduced in the math congress to highlight how doubling is connected to skip-counting by twos.

☀ DAY THREE: THINGS THAT COME IN DOUBLES

A minilesson provides further support in automatizing doubles and using doubles to solve near-doubles problems. The subsequent investigation and math congress offer another opportunity to investigate doubles and to explore odd and even numbers.

☀ DAY FOUR: THINGS THAT COME IN PAIRS—SHOES

A minilesson continues supporting children in automatizing doubles and the use of near doubles. A new context supports an exploration of the relationship between doubles and skip-counting by twos.

☀ DAY FIVE: SHOES AND MORE SHOES

A minilesson continues supporting children in automatizing doubles and the use of near doubles. The subsequent investigation challenges children to use doubling or skip-counting with greater numbers.

☀ DAY SIX: THE SHOE GAME

A math congress gives children a chance to share and discuss their work from Day Five. The Shoe Game highlights the relationship between pairing and doubling.

☀ DAY SEVEN: GRANDMA’S NECKLACE

A new context supports further exploration of pairing and doubling.

☀ DAY EIGHT: THE SECOND NECKLACE

The investigation and math congress challenge children to unitize—to consider a group as a unit.

☀ DAY NINE: THE THIRD NECKLACE

A minilesson provides further support in using doubles to solve near-doubles problems, with a focus on compensation. The investigation provides children with another opportunity to consider the ideas that were emerging on Day Eight.

☀ DAY TEN: GRANDMA’S SPECIAL NUMBERS

A final minilesson supports children in using compensation. The investigation and math congress provide children with a chance to consolidate what they have been learning throughout the unit.

☀ REFLECTIONS ON THE UNIT

3 The Double-Decker Bus: Early Addition and Subtraction

BY MAARTEN DOLK, NINA LIU, AND CATHERINE TWOMEY FOSNOT

☀ DAY ONE: THE DOUBLE-DECKER BUS

The story of a double-decker bus and the introduction of the arithmetic rack model support children in using the five-structure.

☀ DAY TWO: HOW MANY PEOPLE ARE ON THE BUS?

A minilesson and investigation further support children in using the five structure. A math congress gives children a chance to share and discuss their work. The Passenger Pairs game supports the development of more efficient strategies.

☀ DAY THREE: MOVING BETWEEN THE DECKS

A minilesson provides additional support in using the five- and ten-structures. The investigation and math congress focus on the big ideas of compensation and equivalence.

☀ DAY FOUR: CHOICE DAY

A minilesson reinforces and builds on ideas that emerged in the math congress on Day Three. Three different games provide for differentiation and further consolidation of ideas developed in the first three days of the unit.

☀ DAY FIVE: COMBINATIONS OF TEN

An investigation and math congress provide for an exploration of the combinations of whole numbers that sum to ten. A minilesson highlights the strategies of counting on and counting back.

☀ DAY SIX: ADDITION ON THE ARITHMETIC RACK

A minilesson provides additional support for using the combinations of whole numbers that sum to ten. The investigation, math congress, and Bus Stop game support the development of addition strategies.

☀ DAY SEVEN: SUBTRACTION ON THE ARITHMETIC RACK

The investigation, math congress, and new version of the Bus Stop game support the development of subtraction strategies.

☀ DAY EIGHT: WRITING BUS STORIES

A writing project provides an opportunity for children use the computation strategies they have learned. A math congress gives children a chance to share and discuss their strategies.

☀ DAY NINE: WRITING BUS STORIES

A minilesson support some key addition and subtraction strategies. The writing project continues and a math congress highlights the range of addition and subtraction strategies children have now developed.

☀ DAY TEN: SHARING BUS STORIES

A gallery walk and math congress provide an opportunity for you and the children to reflect on and celebrate their mathematical development. A minilesson involving pure numbers revisits use of the five- and ten-structures.

☀ REFLECTIONS ON THE UNIT

4 Organizing and Collecting: The Number System

BY NINA LIU, MAARTEN DOLK, AND CATHERINE TWOMEY FOSNOT

☀ DAY ONE: TAKING INVENTORY

The context of organizing and taking inventory highlights children's early strategies for counting and keeping track.

☀ DAY TWO: CONTINUING THE INVENTORY

The inventory investigation continues and the subsequent math congress gives children a chance to discuss and share their work.

☀ DAY THREE: MAKING PACKS OF TEN

A minilesson of quick images supports children in developing more efficient counting strategies. The investigation encourages children to consider grouping as a way to count more efficiently.

☀ DAY FOUR: MAKING THE CLASS INVENTORY CHART

A math congress focuses on the place value patterns that occur when making groups of ten. The subsequent investigation gives children an opportunity to explore those patterns further.

☀ DAY FIVE: ADDING TO THE CLASS INVENTORY CHART

A math congress gives children a chance to discuss and share their work from Day Four. The investigation involves children in figuring out how to get to the next multiple of ten.

☀ DAY SIX: RECORDING THE ORDERS FOR FULL PACKS AND PLAYING TOSSING FOR TENS

A math congress highlights some new place value patterns. The Tossing for Tens game helps children to learn and develop fluency with combinations of ten, using two or more addends.

☀ DAY SEVEN: MAKING PACKS OF FIVE

The investigation and math congress highlight the relationship between the five- and the ten-structures of our number system.

☀ DAY EIGHT: COLLECTING STAMPS

The Collecting Stamps game and subsequent math congress focus on helpful strategies for addition.

☀ DAY NINE: COMPLETING THE INVENTORY WITH NEW ORDERS

A minilesson of quick images builds on the place value patterns that children have explored during their inventory work. The investigation and math congress explore using place value patterns when adding multiples of ten.

☀ DAY TEN: GAMES

A minilesson of quick images focuses on adding ten to a number. The Collecting Stamps game provides further opportunities to employ strategies developed throughout the unit.

☀ REFLECTIONS ON THE UNIT

5 **Measuring for the Art Show: Addition on the Open Number Line and Subtraction**

BY CATHERINE TWOMEY FOSNOT

☀ DAY ONE: MEASURING FOR THE ART SHOW

The context of preparing for an art show highlights children's early measurement strategies and prepare the way for the emergence of the number line model.

☀ DAY TWO: MEASURING FOR THE ART SHOW

A math congress gives children a chance to share and discuss their work from Day One.

☀ DAY THREE: BUILDING THE BLUEPRINT

A minilesson highlights the place value patterns that result when adding groups of ten. Development of a blueprint model encourages the use of the five- and ten-structures.

☀ DAY FOUR: MEASURING WITH STRIPS OF TEN

A minilesson reminds children of the place value patterns when adding groups of ten. The ten-strip measurement tool further supports the use of the five and ten-structures.

☀ DAY FIVE: MEASURING WITH STRIPS OF TEN

A math congress gives children a chance to share and discuss their work from Days Three and Four.

☀ DAY SIX: EXPLORING ADDITION

A minilesson reviews adding groups of ten within the context of measurement. A new measurement context introduces double-digit addition with strips of ten. A subsequent math congress supports the use of more efficient strategies.

☀ DAY SEVEN: DEVELOPING ADDITION STRATEGIES

A minilesson focuses on the addition strategy of keeping one number whole and adding groups of ten. The game of Leapfrog encourages and reinforces that strategy.

☀ DAY EIGHT: DEVELOPING ADDITION STRATEGIES

A minilesson introduces the open number line model and focuses on decomposing an addend to get to a landmark number. The game of Fly Capture encourages that strategy.

☀ DAY NINE: DEVELOPING ADDITION STRATEGIES WITH THE OPEN NUMBER LINE

A minilesson and individual assessments provide insight into the development of children's addition strategies.

☀ DAY TEN: CELEBRATING THE ART SHOW

A culminating celebration gives children a chance to share what they have been doing and learning throughout the unit.

☀ REFLECTIONS ON THE UNIT

6 Trades, Jumps, and Stops: Early Algebra

BY CATHERINE TWOMEY FOSNOT AND PATRICIA LENT

☀ DAY ONE: THE MASLOPPY FAMILY GOES TO NEW YORK CITY

The context of fair-sharing money introduces the big idea of equivalence. The math congress highlights using substitution to generate equivalent amounts.

☀ DAY TWO: THE PIGGY BANK

A minilesson provides additional support in using substitution to examine for equivalence. The Piggy Bank game supports children in examining mathematical expressions for equivalence, without resorting to arithmetic.

☀ DAY THREE: THE PIGGY BANK

The minilesson and Piggy Bank game provide more experience with substitution and equivalence. The math congress introduces the two-column proof as a tool to examine for equivalence.

☀ DAY FOUR: FOREIGN COINS AND TRADING FOR DIMES

A minilesson engages children in determining equivalence—this time, with a variable added to the expression. The Trading for Dimes game introduces the making tens strategy.

☀ DAY FIVE: USING THE DOUBLE NUMBER LINE

A minilesson introduces the double number line model and emphasizes using the landmark numbers of five and ten in establishing equivalence. A new investigation focuses on substituting equivalent expressions as a shortcut way to subtract.

☀ DAY SIX: USING THE DOUBLE NUMBER LINE

A minilesson emphasizes using the associative and commutative properties to make equivalent expressions. A math congress gives children a chance to generalize the ideas they explored on Day Five.

☀ DAY SEVEN: THE DOUBLE NUMBER LINE AND FOREIGN COINS

A minilesson supports the use of “cancellation” and substitution strategies. The foreign coin investigation and subsequent math congress focus on developing strategies to solve for unknowns.

☀ DAY EIGHT: SUBWAYS

The context of passengers getting on and off subways introduces the concepts of input and output, net change, and ways to organize and generate all possibilities.

☀ DAY NINE: SUBWAYS

Continued work with the subways investigation and the subsequent math congress focus on ways to examine input and output more systematically.

☀ DAY TEN: SUBWAYS

Continued work with the subways investigation and the subsequent math congress focus on an examination of net change and proof that all possibilities have been found.

☀ REFLECTIONS ON THE UNIT

7 Ages and Timelines: Subtraction on the Open Number Line

BY CATHERINE TWOMEY FOSNOT

☀ DAY ONE: EXPLORING AGES

The context of age differences and the introduction of the open number line model support the development of children's subtraction strategies.

☀ DAY TWO: EXPLORING AGES

A minilesson on taking leaps of ten and further investigation of age differences highlight the relationship between addition and subtraction.

☀ DAY THREE: EXPLORING AGES

Preparations for a math congress highlight the connection between several uses for subtraction and reinforce the big ideas of constant difference and the relationship between addition and subtraction.

☀ DAY FOUR: EXPLORING AGES

A math congress gives children a chance to share and discuss their work from the previous three days.

☀ DAY FIVE: INVESTIGATING THEIR FAMILIES

A minilesson explores the efficient use of counting up and counting back. The subsequent family ages investigation introduces the timeline model.

☀ DAY SIX: INVESTIGATING THEIR FAMILIES

A minilesson encourages taking leaps of ten and using landmark numbers. Additional work with the family ages investigation highlights the development of children's strategies.

☀ DAY SEVEN: INVESTIGATING THEIR FAMILIES

A minilesson on constant difference and additional work with the family ages investigation support the development and consolidation of children's understanding of subtraction as difference.

☀ DAY EIGHT: INVESTIGATING THEIR FAMILIES

A minilesson reinforces the use of constant difference. The final family ages investigation highlights the connection between various types of subtraction problems.

☀ DAY NINE: ASSESSMENT

A minilesson and individual assessments provide insight into how children vary their subtraction strategies based on the numbers in the problems.

☀ DAY TEN: CELEBRATING THE MATHEMATICIANS' STORIES

A culminating celebration gives children a chance to share what they have been doing and learning throughout the unit.

☀ REFLECTIONS ON THE UNIT

8 **The T-Shirt Factory: Place Value, Addition, and Subtraction**

BY CATHERINE TWOMEY FOSNOT

DAY ONE: ROLLS OF T-SHIRTS

The context of packing T-shirts in groups of ten introduces the big ideas of equivalence and place value. The math congress introduces the t-chart model as a way to highlight place value patterns and promote systematic exchange.

DAY TWO: ESTABLISHING EQUIVALENCY

A minilesson supports the use of partial sums for addition. The investigation and subsequent math congress focus on place value, equivalence, and systematic exchange.

DAY THREE: ESTABLISHING THE FACTORIES

An addition minilesson highlights the place value concepts explored on Day Two. The investigation and math congress focus on addition strategies that are efficient and make sense.

DAY FOUR: STORAGE BOXES

A subtraction minilesson further supports children's understanding of place value. The storage box context introduces regrouping with hundreds.

DAY FIVE: WHAT'S IN THE WAREHOUSE?

An inventory investigation focuses on equivalence.

DAY SIX: THE ACCOUNTING OF T-SHIRT SALES

An investigation involving T-shirt sales and inventory tracking focuses on place value, equivalence, and regrouping for subtraction.

DAY SEVEN: REPLENISHING THE WAREHOUSE

An extension of the storage box investigation highlights ideas regarding place value and equivalence, this time with three- and four-digit numbers. The subsequent math congress focuses on place value relationships and the relationship between addition and subtraction.

DAY EIGHT: MORE SALES

A more extensive T-shirt sales investigation focuses on a range of addition and subtraction strategies with three- and four-digit numbers.

DAY NINE: MORE SALES

Additional work with the sales investigation further supports the development of children's understanding of place value.

DAY TEN: AUDITS AND MERGERS

A culminating math congress highlights the strategies children have developed throughout the unit.

REFLECTIONS ON THE UNIT