

# Unit 1: Operations and Algebraic Thinking (Grade 2)

Content Area: **Mathematics**  
Course(s): **Mathematics - Grade 2**  
Time Period: **1st Marking Period**  
Length: **12 Weeks**  
Status: **Published**

## Unit Overview

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Utilize addition and subtraction concepts to recognize number patterns and add & subtract two-digit numbers.

\* **Beginning of Year Benchmark Fluency Assessment (untimed) - basic facts up to 20**

## Transfer

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Students will be able to independently use their learning to...

- Apply addition and subtraction concepts.
- Identify patterns in numbers.
- Add and subtract two-digit numbers.

For more information, read the following article by Grant Wiggins.

[http://www.authenticeducation.org/ae\\_bigideas/article.lasso?artid=60](http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60)

## Meaning

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## Understandings

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Students will understand that...

\* Addition properties such as the Commutative Property and Identity Property can help students solve

addition and subtraction problems.

- \* A number line can be used to count on and count back in solving addition and subtraction problems.
- \* Related facts (fact families), doubles facts, and making 10 are multiple strategies that can be used to solve addition and subtraction problems.
- \* Using skip counting, repeated addition, and even & odd numbers can help students recognize number patterns in order to relate addition and multiplication.
- \* Numbers can be broken apart to end with zero to aid in adding and subtracting larger numbers.
- \* Number in the ones place may need to be regrouped when adding and subtracting larger numbers.
- \* Fact strategies and regrouping can be utilized to add three and four two-digit numbers.
- \* Addition can be utilized to check subtraction of larger numbers.

## **Essential Questions**

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Students will keep considering...

- \* What strategies can I use to add and subtract?
- \* How can equal groups help me add?
- \* How can I add two-digit numbers?
- \* How can I subtract two-digit numbers?

## **Application of Knowledge and Skill**

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## **Students will know...**

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Students will know...

- \* Addition and Subtraction Properties
- \* Counting On / Counting Back to Add and Subtract (utilize a number line)
- \* Fact Families (One and Two-Digit)
- \* Doubles Facts to Add and Subtract
- \* Make 10 to Add
- \* Skip Counting
- \* Repeated Addition
- \* Even and Odd Numbers
- \* Add & Subtract Two-Digit Numbers with and without Regrouping
- \* Add Three and Four Two-Digit Numbers
- \* Check Subtraction with Addition

### **Students will be skilled at...**

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Students will be skilled at...

- \* Utilizing fact strategies to solve addition and subtraction problems.
- \* Recognizing number patterns.
- \* Solve larger addition and subtraction problems with and without regrouping.
- \* Utilizing addition as a strategy to check subtraction problems.

### **Academic Vocabulary**

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#### **Chapter 1:**

add  
addend

sum  
count on  
doubles  
near doubles  
count back

subtract  
difference  
related facts  
missing addend  
fact family

**Chapter 2:**  
skip count  
equal groups  
repeated addition  
array  
even  
odd

**Chapter 3:**  
regroup

**Chapter 4:**  
n/a

**Please review the following terms from the previous year:**

addends  
sum

## **Daily Targets - Apply Addition and Subtraction Concepts: Chapter 1**

SWBAT:

- \* use the Commutative Property and the Identity Property to find sums - **(Chapter 1 / Lesson 1) DOK 2**
- \* use a number line to count on when adding - **(Chapter 1 / Lesson 2) DOK 1**
- \* use doubles and near doubles to find sums - **(Chapter 1 / Lesson 3) DOK 1**
- \* make a 10 to solve addition problems - **(Chapter 1 / Lesson 4) DOK 3**
- \* add three numbers to find the sum - **(Chapter 1 / Lesson 5) DOK 2**
- \* write a number sentence to solve problems - **(Chapter 1 / Lesson 6) DOK 3**
- \* count back to find the difference - **(Chapter 1 / Lesson 7) DOK 1**
- \* subtract zero or subtract all to find the difference - **(Chapter 1 / Lesson 8) DOK 1**

- \* use doubles facts to find the difference - **(Chapter 1 / Lesson 9) DOK 3**
- \* use addition facts to subtract - **(Chapter 1 / Lesson 10) DOK 3**
- \* use subtraction facts to help find missing addends - **(Chapter 1 / Lesson 11) DOK 2**
- \* use related facts to write fact families - **(Chapter 1 / Lesson 12) DOK 1**
- \* solve word problems that involve two steps - **(Chapter 1 / Lesson 13) DOK 4**
- use the Commutative Property and the Identity Property to find sums - (Chapter 1 / Lesson 1)

## **Daily Targets - Number Patterns: CHAPTER 2**

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SWBAT:

- \* use patterns to skip count - **(Chapter 2 / Lesson 1) DOK 1**
- \* model skip counting to find the total in equal groups - **(Chapter 2 / Lesson 2) DOK 1**
- \* find a pattern to solve problems - **(Chapter 2 / Lesson 3) DOK 2**
- \* use repeated addition to add equal groups - **(Chapter 2 / Lesson 4) DOK 2**
- \* use arrays with repeated addition - **(Chapter 2 / Lesson 5) DOK 3**
- \* find even and odd numbers in number patterns - **(Chapter 2 / Lesson 6) DOK 2**
- \* find sums of equal numbers - **(Chapter 2 / Lesson 7) DOK 1**

MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.2.OA.B.2	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
MA.2.OA.C.3	Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
MA.2.OA.C.4	Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
MA.2.NBT.A.2	Count within 1000; skip-count by 5s, 10s, and 100s.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

MA.K-12.5

Use appropriate tools strategically.

MA.K-12.6

Attend to precision.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

### **Daily Targets - Add Two-Digit Numbers: CHAPTER 3**

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SWBAT:

- \* take apart an addend to make a ten to add - **(Chapter 3 / Lesson 1) DOK 3**
- \* use models to regroup ones as tens to add - **(Chapter 3 / Lesson 2) DOK 2**
- \* add on-digit numbers and two-digit numbers - **(Chapter 3 / Lesson 3) DOK 2**

- \* add two-digit numbers - **(Chapter 3 / Lesson 4) DOK 2**
- \* rewrite horizontal addition problems vertically to add - **(Chapter 3 / Lesson 5) DOK 1**
- \* add three and four two-digit numbers - **(Chapter 3 / Lesson 6) DOK 3**
- \* make a model to solve problems - **(Chapter 3 / Lesson 7) DOK 3**

MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.2.NBT.B.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MA.2.NBT.B.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
MA.2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of

these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

## **Daily Targets - Subtract Two-Digit Numbers: CHAPTER 4**

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SWBAT:

- \* use related facts to make two-digit fact families - **(Chapter 4 / Lesson 1) DOK 1**
- \* take apart numbers to make a ten to subtract - **(Chapter 4 / Lesson 2) DOK 3**
- \* use models to regroup and find differences - **(Chapter 4 / Lesson 3) DOK 2**
- \* subtract one-digit numbers from two-digit numbers - **(Chapter 4 / Lesson 4) DOK 2**
- \* subtract two-digit numbers - **(Chapter 4 / Lesson 5) DOK 2**
- \* rewrite a horizontal two-digit subtraction sentence vertically before subtracting - **(Chapter 4 / Lesson 6) DOK 1**
- \* use addition to check subtraction - **(Chapter 4 / Lesson 7) DOK 2**
- \* write a number sentence to solve problems - **(Chapter 4 / Lesson 8) DOK 4**
- \* read and solve two-step word problems - **(Chapter 4 / Lesson 9) DOK 4**

MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.2.NBT.B.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
MA.2.NBT.B.9	Explain why addition and subtraction strategies work, using place value and the properties of operations.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.

## **Formative Assessment and Performance Opportunities**

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- \* "Am I Ready?"
- \* End of Lesson "On My Own" and "Homework" activities
- \* Journal Writing Activity
- \* Exit Slips
- \* Chapter Quizzes
- \* S.T. Math
  - Addition and Subtraction Situations
  - Addition and Subtraction Situations within 100
  - Two Step Situations
  - Equal Groups
  - Challenge
- \* Teacher Observation / Anecdotal Notes
- \* Student Interview
- \*LinkIt

Chapter 1 Performance Task: **Restaurant Menu** DOK 2; DOK 3- Use Addition and SUBtraction of 2-3 numbers and a number line to help problem solve (Rubric in TM pg. 98PT2)

Chapter 2 Performance Task: **Spinning for Coins** DOK 2, DOK 3- Use even and odd numbers and addition to assist Ryan while he learns the rules of a new game (Rubric in TM pg. 156PT2)

Chapter 3 Performance Task: **Bird Houses** DOK 2, DOK 3- Use addition of 2-3 digit numbers and drawings to help them fill bird house orders (Rubric in TM pg. 214PT2)

Chapter 4 Performance Task: **Making a Room Border** DOK 2, DOK 3: Use subtraction of two-digit numbers and use drawings to solve problems (Rubric in TM pg. 284PT2)

### **Chapter Projects Available in Student Book:**

Chapter 1 Project: Math Posters for Vocabulary (pg. 2)

Chapter 2 Project: Math Posters for Math Concept (pg. 100)

Chapter 3 Project: A Guide to Adding Two Digit Numbers (pg. 158)

Chapter 4 Project: Teach a Lesson Review (pg. 216)

## **Summative Assessment**

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- \* Beginning of Year Benchmark Fluency Assessment (untimed) - basic facts up to 20
- \* Chapter Tests (Chapters 1, 2, 3, 4) - Forms 1, 2, & 3 - Written or On-line Assessment
- \* Fluency Assessment (timed) - end of 1st trimester - basic facts up to 20

Additional Resources Available for Assessment Purposes:

- \* Vocabulary Test
- \* Oral Assessment
- \* Listening Assessment

## **21st Century Life and Careers and Technology**

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CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of

	the organization.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CAEP.9.2.4.A	Career Awareness
CAEP.9.2.4.A.2	Identify various life roles and civic and work - related activities in the school, home, and community.
CAEP.9.2.4.A.4	Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.
TECH.8.1.2.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.2.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.

## **Accommodations and Modifications**

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- \*Utilize manipulatives during instruction to teach and demonstrate concepts
- \*Give students manipulatives to model all problems (connecting cubes, counters)
- \*Give students number organizational tool to solve basic facts (hundreds chart, number line, part-part whole mat)
- \*Provide reference tool for vocabulary (notebook, flashcards, or foldable)
- \* Small Group Instruction
- \*A slower pace of verbal instruction
- \*Various representations of directions
- \*Visual and digital display as well as explanation of domain specific and academic vocabulary
- \*Verbal communication of not only concept but also language goals (ELL)
- \*Written and verbal examples given of these goals
- \*Concepts evaluated for age level as well as cultural appropriateness based on the students background (ELL)
- \*Allow higher level learners to assist in teaching concepts that they have mastered previously
- \* Enrichment pages from notebook
- \*Use TAG manipulative kits
- \*Provide addition and subtraction problems into the thousands place

## Unit Resources

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- \* McGraw-Hill "My Math" Grade 2 Text
  - \* Chapters 1, 2, 3, 4
  
- \* McGraw-Hill "My Math" Website - [www.connected.mcgraw-hill.com](http://www.connected.mcgraw-hill.com)
  - \* Virtual Manipulatives
  - \* Virtual Games (Sail Through Math, Fact Dash, etc.)
  - \* Math At Home - Practice Math
  - \* Grouping By Tens
  - \* Math Songs (Addition Boogie, Meet My Fact Family, We Are a Family, Take It Away, The Number Line, Jumping to Add, etc.)
  
- \* Real World Problem Solving Library:
  - \*How Many Seeds?
  - \* Kitchen Math
  - \*Our Grandma's Life
  
- \* BrainPop Jr. - [www.brainpopjr.com](http://www.brainpopjr.com)
  
- \* Math Fact Cafe - [www.mathfactcafe.com](http://www.mathfactcafe.com)
  
- \* ST Math
- \* Student Center: online games and digital support resources for school and home
- \* STEM app-download fro home and practice [www.mheonline.com](http://www.mheonline.com)
- \*My Math Trade Books to improve interdisciplinary connections

\* Fun Brain - [www.funbrain.com](http://www.funbrain.com)

\* Cool Math 4 Kids - [www.coolmath4kids.com](http://www.coolmath4kids.com)

\* AAA Math - [www.aaamath.com](http://www.aaamath.com)

\* <http://achievethecore.org/coherence-map/>

\* <https://www.illustrativemathematics.org/>

## **Interdisciplinary Connections**

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*How Many Seeds?* Allows students to study a diagram to follow the life cycle of a plant. Students also investigate the numbers of seeds in a variety of plants and read charts to compare and analyze data. (2.OA.1)

*Kitchen Math* provides an opportunity for students to explore cooking and using math in the kitchen. The story incorporates opportunities to practice following directions and using fractions. (2.OA.4)

*Our Grandma's Life* allows students to compare life during the early 1960s to today, using map skills and math skills to understand comparisons and measurements. (2.OA.1)

LA.RF.2.4.A	Read grade-level text with purpose and understanding.
LA.RF.2.4.C	Use context to confirm or self-correct word recognition and understanding, rereading as necessary.
LA.RI.2.3	Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
SOC.6.1.4.B	Geography, People, and the Environment
2-LS2	Ecosystems: Interactions, Energy, and Dynamics
2-LS2-1.LS2.A.1	Plants depend on water and light to grow.