

# 02-Operations and Algebraic Thinking

Content Area: **Math**  
Course(s):  
Time Period: **Full Year**  
Length: **8 weeks**  
Status: **Published**

## General Overview, Course Description or Course Philosophy

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Kindergarten instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics.

1. Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as  $5 + 2 = 7$  and  $7 - 2 = 5$ . (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.
2. Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

In this unit, students will focus on the following skills and concepts:

- Represent addition and subtraction up to 10 with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g.,  $5 = 2 + 3$  and  $5 = 4 + 1$ ).
- For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or

equation.

- Demonstrate fluency for addition and subtraction within 5.

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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### Enduring Understandings:

- There are many ways to represent a number.
- Making a sum of 10 will be important to make work easier.
- Numbers represent quantities and can be combined to find sums and differences.
- Real-world problems can be solved by counting, ordering, adding, and subtracting numbers.
- Addition involves adding to and putting together.
- Subtraction involves taking from, taking apart and comparing.

### Essential Questions:

- What happens when we combine groups, and what happens when we take groups apart?
- How can drawings and objects be used to solve addition and subtraction problems?
- How can we represent number sentences (numerals, objects, pictures, words)?
- Why do we need to add and subtract?

## **CONTENT AREA STANDARDS**

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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.
MA.K.OA	Operations and Algebraic Thinking
MA.K.OA.A	Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.
MA.K.OA.A.1	Represent addition and subtraction up to 10 with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
MA.K.OA.A.2	Solve addition and subtraction word problems, and add and subtract within 10, e.g., by

	using objects or drawings to represent the problem.
MA.K.OA.A.3	Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$ and $5 = 4 + 1$ ).
MA.K.OA.A.4	For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
MA.K.OA.A.5	Demonstrate fluency for addition and subtraction within 5.

## **RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)**

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LA.SL.K.1	Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.
LA.SL.K.1.A	Follow agreed-upon norms for discussions (e.g., listening to others with care and taking turns speaking about the topics and texts under discussion).
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others
WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.1	Act as a responsible and contributing community members and employee.

## **STUDENT LEARNING TARGETS**

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- I can represent adding situations, expressions or equations using:
  - Objects
  - Fingers
  - Mental images
  - Drawings
  - Sounds (e.g., claps)
  - Acting out situations
- I can explain the meaning of addition
- I can explain the meaning of subtraction
- I can identify the "+" and "=" symbols and explain what they mean
- I can use counting to solve "add to" and "put together" word problems within 10
- I can act out the addition problem and/or use objects, fingers, drawings, etc. to represent

the situation

- I can use counting to solve "take apart" and "take from" word problems within 10
- I can act out the subtraction problem and/or use objects, fingers, drawings, etc. to represent the situation
- I can break apart numbers less than or equal to 10 into different pairs of numbers
  - (e.g., 5 can be broken into 1 and 4, 2 and 3, etc.)
- I can list all the possible number pairs for a given number
- I can use objects or drawings to show different ways to break apart a number
- I can write down each example using a drawing or equation
- I can use objects, drawings, or a model to show two numbers can be added to make a 10
- I can use objects or representations to find the number that "makes a 10" when added to any given number from 1 to 9
- I can explain how you used the objects or representation to find the missing part of 10
- I can use objects, drawings, or other representations to show different ways to make a 10
- (e.g., 10 frame, cubes, different color counters, etc.)
- I can write down each example using a drawing or equation
- I can add and subtract fluently within 5 showing:
  - Accuracy (correct answer)
  - Efficiency (a reasonable number of steps in 3-5 seconds without counting)
  - Flexibility (using various strategies)

### **Declarative Knowledge**

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Students will understand:

- Accuracy, efficiency, and flexibility are essential when adding and subtracting within 10.
- Strategies can be valuable to complete addition and subtraction problems.

- Pictures can be used to organize the information in one-step word problems.
- Math explanations are used to defend and explain one's math thinking.
- Essential vocabulary: sum, difference

## **Procedural Knowledge**

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Students will be able to:

- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g.,  $5 = 2 + 3$  and  $5 = 4 + 1$ ).
- For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
- Fluently add and subtract within 5.

## **EVIDENCE OF LEARNING**

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Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

## **Formative Assessments**

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- Self-Assessments/Student Friendly Scales
- White-board responses
- Exit Tickets
- Math Talks
- Participation
- Teacher Observation
- IXL

## **Summative Assessments**

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- Benchmark Assessment/SGO Assessment

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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Everday Counts Calendar Math Grade K

IXL

Everday Mathematics Resources and Grade K Lessons:

1.9-1.11

2.5

2.9

2.12-2.13

3.2

4.5

4.8

5.2

5.3

5.7

5.9-5.11

6.8-6.9

6.11-6.13

7.1-7.2

7.9-10

7.12

8.5

8.7-8.9

## **INTERDISCIPLINARY CONNECTIONS**

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- Technology/Multimedia: Educational Tech Applications
- Career Readiness: Utilize Critical Thinking to Make Sense of Problems and Persevere in Solving Them
- English/Language Arts: Literacy suggestions:
  - This Old Man
  - Rooster Is Off to See the World
  - More, Fewer, Less
  - Splash!
  - Equal Shmequal
  - Chugga-Chugga Choo-Choo
  - Domino Addition
  - 12 Ways to Get to 11
  - The Gingerbread Boy
  - Animals on Board
  - Elevator Magic
  - A Remainder of One
  - Five Little Ducks
  - One Is a Snail, Ten Is a Crab
  - Little Quack
  - Market Day
  - Pattern Bugs
  - Pattern Fish
  - Changes, Changes
  - The Quilt
  - Brown Bear, Brown Bear, What Do You See?
  - I Know An Old Lady Who Swallowed a Fly
  - The Little Red Hen
  - Beep Beep, Vroom, Vroom
  - Roll Over!: A Counting Song
  - I Went Walking
  - A Chair for My Mother

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.

- modify activity
- simplify directions
- check-ins
- visuals
- manipulatives
- wait time
- additional time for tasks
- verbal responses
- illustrations