Unit 1: Domain: Operations and Algebraic Thinking

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Marking Period 1**
Length: **13-14 Weeks**
Status: **Published**

Unit Overview

In the Number Sense and Operations Unit, learners will review kindergarten skills of one-to-one correspondence, counting and writing numbers to 20. Building on this review, they will explore addition using the concept of adding two parts (joining) to find the whole. This will be supported through the use of concrete objects and pictures. Similarly, learners will explore subtraction, separating parts from the whole, with concrete objects and pictures. Problem-solving skills will be developed through comparing, joining and choosing the appropriate operation for a story problem. Using concrete objects and pictures, the learners will discover the related nature of addition and subtraction sentences. By comparing a variety of solution strategies, learners relate addition and subtraction as inverse operations.

Standards

MA.1.OA.A	Represent and solve problems involving addition and subtraction.
MA.1.OA.A.1	Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
MA.1.OA.A.2	Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
MA.1.OA.B	Understand and apply properties of operations and the relationship between addition and subtraction.
MA.1.OA.B.3	Apply properties of operations as strategies to add and subtract.
MA.1.OA.B.4	Understand subtraction as an unknown-addend problem.
MA.1.OA.C	Add and subtract within 20.
MA.1.OA.C.5	Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
MA.1.OA.C.6	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
MA.1.OA.D	Work with addition and subtraction equations.
MA.1.OA.D.7	Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.
MA.1.OA.D.8	Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers.

Essential Questions

- How do mathematical ideas interconnect and build on one another to produce a coherent whole?
- How can we compare and contrast numbers?
- How do operations affect numbers?
- What makes a computational strategy both effective and efficient?

Application of Knowledge and Skills...

Students will know that...

- "doubles plus one" is related to the count on strategy and includes facts in which one addend is greater than the other
- "doubles" includes facts in which both addends are the same
- a missing part of a whole can be found when the whole and the other part are known
- addends can be presented in any order and result in the same sum
- adding zero to a number equals the original number
- addition and subtraction have an inverse relationship
- addition and subtraction have an inverse relationship
- addition is the joining of parts to make a whole
- addition number sentences can be used to show parts of a whole
- counting on is an efficient strategy when the numbers are close in value
- fact families can be used to add or subtract numbers
- numbers have constant and reliable order
- numbers to 10 can be represented on a ten-frame using 5 and 10 as benchmarks
- subtracting a number from itself equals zero
- subtracting with teen numbers can be simplified by making a relationship of 10
- subtracting zero from a number equals the original number
- subtraction can be done by comparing two quantities to find how much more/less one quantity is than the other
- the commutative property, or order property, allows one to add numbers in any order
- the difference can be written at the beginning or end of a subtraction sentence
- the number 10 can be broken into parts of the whole
- the number relationships of 0-less-than, 1-less-than, and 2-less-than are the basis for subtraction facts with a 0, 1, and 2
- the number relationships of 0-less-than, 1-less-than, and 2-less-than are the basis for subtraction facts with a 0, 1, and 2

- there are multiple ways that a whole can be broken into parts and multiple parts that can equal the same whole
- three numbers can be grouped and added in any order

Students will be able to...

- build fact families
- choose strategies that help them add and subtract
- choose the appropriate operation (addition or subtraction) when responding to a story problem
- connect addition to subtraction problems
- count one by one or twos
- count, read, and write numbers to 20
- identify and write related addition and subtraction facts.
- solve addition and subtraction problems by joining and separating concrete objects, pictures, and symbols
- use doubles to add and subtract other facts
- use doubles to add and subtract other facts
- use one-to-one correspondence to compare groups
- write multiple addition sentences to express the same sum and multiple subtraction sentences to identify the parts of the same number
- write vertical and horizontal addition and subtraction sentences

Assessments

- Placement Test: used to test prior knowledge
- Benchmark Tests
- End of the Year Test
- More, Fewer and Equal Groups: Compare groups to determine which one has more, fewer or if they are equal
- Task Cards: used as a reinforcement of a topic
- Topic Math Projects
- Topic Quick Checks: can be given after each section in the topic to check for understanding
- Topic Tests: given after each topic
- Use Pictures to Subtract : Use pictures to solve how many are left
- Use Symbols to Add and Subtract: Using pictures, write and solve addition and subtraction sentences.
- War Card Game : Play the card game, War, identifying the greater of two numbers.
- Whole, Part, Part: Using a workmat, separate part of the whole number to find the remaining part
- Write the Number that tells How Many: From a picture, write the number and tell how many

Activities

Problem of the Day: sets the stage for what students will be learning that day

Math Stations: reinforces topics taught each day

Station activities- Each section has center activities to reinforce skill (leveled)

- Clip and Cover- Students answer questions and try to cover four spaces in a row on a gameboard to win.
- Display the Digits- Students answer the problem and display the tile that represents the answer.
- Quick Questions- Toss number cubes and answer questions.
- Team Work- Students in turn explain the steps in a multi-step process.
- Think Together- Students choose and discuss answers to problems.
- Tic Tac Toe- Students use algebra to compute solutions to problems.
- Toss and Talk- Students toss number cubes and explain how to solve resulting problems

Interactive Learning: Problem-Based Interactive learning activities at the beginning of each topic such as using tools, structure,reasoning, generalizing, assessing reasonableness and modeling

Topic Opener Projects: sets the stage for what students will be learning in the unit

Interactive Math Stories: gives the students an initial look into the new unit

Practice Work: leveled worksheets/activities

Ticket to Leave: way to assess at the end of a lesson

Other Activities: (Vocabulary shown in bold type)

- Match two groups to determine if they have the **same** number. If not, find which one has more or fewer and how many **more** or **fewer**.
- Recognize parts of a number as a strategy for addition (Vocabulary: **in all, inside, outside**)
- Recognize that numbers 6, 7, 8, and 9 can be broken into parts of the whole in different ways (Vocabulary: **part, whole, double**)
- Write addition expressions and number sentences to find the whole, given two parts (Vocabulary: **plus +, add, sum, addition sentence, equals =**)
- Count and write numbers to 10 using the word, numeral, a picture, and counters to express how many.
- Count and write the numbers from 11 to 20 using the word, numeral and counters in ten frames.
- Use counters and a ten-frame to model numbers up to 10.
- Show 10 as two parts.

- Using concrete objects, **join** two groups to determine how many there are in all.
- Model and solve an addition sentence using the **part, part, whole** concept to find missing parts of 10.
- Use objects and drawing to solve problems by finding the **missing part** when one part and the whole are given.
- Tell and act out stories about taking away to find how many are left.
- Using pictures, write the related addition and subtraction sentences.
- Solve story problems by writing addition sentences or by using objects.
- Model, write, and solve **take away** problems using concrete objects and drawings. (Vocabulary:**subtract, are left**)
- With the support of pictures, make a **subtraction sentence** and solve for the **difference**. (Vocabulary: **minus sign** -, **equal sign** =)
- Write and identify different subtraction sentences that have the **same amount**.
- Make tables to solve problems.
- **Count on** one or two numbers to find sums.
- Use a **number line** to count on using small numbers to find sums to 12.
- Count on from the greater number.
- Use **doubles** as a strategy to solve addition facts through 12.
- Use doubles and near doubles as strategies to find sums to 12.
- Use the strategies, count on, doubles, and near doubles, to practice facts to 12.
- Use two ten-frames to model addition facts.
- Solve addition story problems by using the strategy, draw a picture.
- **Count back** one or two numbers to subtract from 12 or less.
- **Subtract** from 12 or less using a number line to count back.
- Use addition as a strategy to subtract numbers from 12 or less.
- Use the strategies, count back and think addition to subtract, to practice subtraction facts.
- Solve problems by using the strategy, write a number sentence.
- Identify **related addition facts** to 12.
- Solve two-question problems by using the answer to the first question to answer the second question.
- solve addition problems where one addend is 8 or 9.
- Use the associative and commutative properties to add three numbers.
- Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.
- Using pictures and unifix cubes, demonstrate that the **order** of **addends** will not change the sum.
- Using two-colored counters, make 10 to subtract.
- Using manipulatives or pictures, make a ten to solve subtraction story problems.
- Find subtraction facts to 18 and learn the relationship between addition and subtraction. (**related facts**)
- Model and solve subtraction sentences using the **whole, part, part** concept .
- Use a part-part-whole model to find the subtraction facts and addition facts in a **fact family**.
- Use a related addition fact to find the missing part in a subtraction problem.
- Identify **fact families.**
- Record fact families.
- Complete a table by using a **rule**
- Represent equivalent forms of numbers to 12.
- Create addition and subtraction situations, and write the corresponding number sentence.
- Solve problems by using the strategy, draw a picture.

Activities to Differentiate Instruction

General strategies for modification of this curriculum for students with special needs, ELL, and gifted learners:

- **General strategies:**
  - preferential seating
  - manipulatives
  - modified workbook pages
  - practice or enrich homework pages
- **Center activities** - There are leveled center activities for each section. There is a separate activity for "Intervention", and then "On-Level" and "Advanced" are in spiral book.
- **Leveled practice pages** - There are three leveled (Reteaching, Practice, and Enrichment) sheets that can be used for practice or homework.
- **Math Concept Readers:** These readers allow the student to read the story at different levels- above level, on level, and below level. (also available on line with audio) Complete the Think and Respond and Write Math questions at the conclusion of each book.
- **Assessment**- Using Quick Check Review can determine differentiated instruction levels using sample answers and using the rubric at the Close/ Assess and Differentiate section in the teacher edition.

Content specific modification for students with special needs, ELL, and gifted learners:

- **Topic 1**
  - **Below level students:**
    - Review number names with children who learn at a slower rate. Count aloud and have them hold up the proper number of fingers for each number.
    - Post basic addition facts in the classroom and review frequently.
  - **Students with special needs:**
    - Use hands-on strategies to help children make connections between what they hear or read and the meaning of the words.
    - Read an addition word problem aloud. Pause after each number and have children model it with number cards or counters. Have children say or model the solution.
  - **ELL**
    - Demonstrate addition situations to give English language learners practice with the language of problems.
    - **Emerging:** I want you to show me what the word join means. Ask one child to join another. Model by leading him or her to the right place and say, "You are joining (second child's name) now." Continue until all children have joined into one group. Say, "There are (number of children) in all."
    - **Expanding:** Have one child ask another to join him or her. (Sample question: Juan, will you join me?) Have the second child tell what happened. (Sample answer: I joined Kia.) Continue until all children have joined in. How many children are there in all?
    - **Bridging:** Have children direct their own class-joining situations. They might say, "Mina, I want you to join Kia and Juan." Ask them to tell how many children there are in all.
  - **Advanced/Gifted:**
    - Children with a strong number sense might benefit from using math webs. They can put the number 8 in a circle and draw 8 spokes from the circle. Then they can add a circle at the end of each spoke. In the outer circles they can write addition problems with sums of 8, like 7+ 1.
- **Topic 2**

- **Below level students:**
  - Understanding subtraction problems that involve comparing is more difficult than understanding problems involving separating. The models of separating are easily understood, but some children have difficulty relating comparing to subtracting.
  - Use manipulatives and the idea of 1-to-1 correspondence to model comparing. Use problems such as, "There are 7 children and 4 chairs. How many children do not get a chair?" Have children model the situation using manipulatives and help them see that when all the chairs are occupied, 3 children still do not have a chair. Model the situation for them using both mathematical vocabulary and number sentences.
- **Students with special needs:**
  - Use manipulatives with children to reinforce the concepts of addition and subtraction. Have a pile of connecting cubes or other manipulatives for children to use. Have each child start with 5; then have them add or subtract various numbers from their piles. Each time, write the number sentence on the bard. Emphasize the _ or - sign and ask, "Did your pile get bigger or smaller?"
  - Give children manipulatives to use while working through the problems in this topic.

- **ELL**
  - English language learners can readily learn the basic concept of subtraction and simple number sentences by using manipulatives.
  - **Emerging:** Whenever possible, have children use manipulatives or draw pictures to help them visualize the meaning in problems that require subtraction.
  - **Expanding:** When reading problems together, ask children which word(s) told them to use subtraction. Then have them create a similar problem using the same word(s).
  - **Bridging:** Have children practice their vocabulary by having them create problems to go with pictures. Have them draw a picture that would represent a subtraction situation and then make up a problem that goes with it. Have them write a number sentence to solve the problem. Then, as time allows, have them present their problems and solutions to others.

- **Advanced/Gifted:**
  - Some children easily comprehend the basic mechanics and meaning of subtraction. They are ready to deepen their understanding of the uses of subtraction.
  - Encourage children to use mathematical vocabulary as they develop their own problems and explain the solutions.

- **Topic 3**
  - **Below level students:**
    - Children who are working below grade level may need more time to understand how to use a ten-frame and to learn the different ways to make ten.
    - Give these children lots of extra practice with this concept since its mastery is important to success in later topics in math.
  - **Students with special needs:**
    - Allow children to use connecting cubes or counters to help them solve problems in this topic. Although some children will only feel comfortable counting actual objects, encourage them to also begin visualizing.
    - Provide children with many opportunities to practice "ten facts".

  - **ELL**
    - The topic of Five and Ten Relationships is especially beneficial to English language learners because it illustrates numbers through ten in a very tangible manner.
    - **Emerging:** Have children draw ten-frames to represent the numbers one through ten.

Next to each have them write the numeral and the English name of the number.

- **Expanding:** Reinforce the words whole and missing part by using them in contexts familiar to children. Give an example such as, "Mom baked 10 muffins. Now there are only 3. what is the missing part?"
- **Bridging:** Encourage children to use the words part, missing part, and whole. Ask a child to "teach" the group how to make ten using the given words.

- **Advanced/Gifted:**
  - Children who can easily display numbers on a ten-frame will be ready to explore other representations of numbers. Help them observe that while there are multiple ways to illustrate a number, the quantity it represents stays constant. Have children evaluate different representations for ease in both creating and comprehending.
  - Children who know numbers greater than ten might enjoy extending their representations to greater numbers. Have them figure out the most efficient ways to show numbers greater than ten.

- **Topic 4**
  - **Below level students:**
    - Children who do not readily visualize sums of 10 will have problems applying those sums to the addition of greater numbers. Once they are able to recognize sums of 10 without hesitation, they will be able to apply addition strategies more quickly and accurately.
    - Begin by reinforcing the idea of 10 with counters and a ten-frame. Once children understand that several different pairs of addends can equal 10, give them lots of repetition so they can easily recognize number pairs that total 10.
  - **Students with special needs:**
    - Special needs children may require extra practice with concrete and visual materials. It is important to give them enough repetition to fully develop each concept before progressing to the next.
    - When beginning a new concept, briefly reinforce previously learned material that you will refer to in the new lesson. For instance, ask questions such as "Who remembers what a double is?" or "What does it mean to find the sum?" before asking children to apply doubles or sums in new contexts.

  - **ELL**
    - Emphasize the verbal and symbolic language used to describe addition and subtraction situations. Practice using this language to relate known facts to unknown facts through repeated modeling.
    - **Emerging:** Have children point to numbers on a chart to answer 1 less than, 2 less than, and 0 less than questions about addition and subtraction facts.
    - **Expanding:** Have children model, using counters, the part-part-whole relationship and label 1 less than, 2 less than, and 0 less than models.
    - **Bridging:** Have children write subtraction facts that show 1 less than, 2 less than, and 0 less.

  - **Advanced/Gifted:**
    - Advanced children are able to use a variety of strategies and procedures to solve subtraction problems quickly.

- **Topic 5**
  - **Below level students:**
    - Below level performers often have poor retention of facts. They may need extra

practice and frequent review to firmly fix facts in their minds.

- **Students with special needs:**
  - When working with special needs students, try breaking the task down into smaller tasks.
  - For example, when using the addition strategy of making 10 to add 9, there are at least three steps involved. To add 9 + 5, the child must.
    1. decide how many it takes to make the 9 into 10
    2. make the 10 by taking 1 from the 5 and leaving 4
    3. add the 10 and the 4 to make 14

- **ELL**
  - English language learners need to understand and adopt the verbal and symbolic language used to describe joining and part-part-whole representations. Addition sentences must be connected both to problem situations and to concrete representations in order for the symbols to have any meaning. Children will need extra help with special terms used for addition strategies (doubles, doubles plus 1, and so on).
  - Put 7 cubes in a row. Have a child put 7 cubes net to yours. Together with the children, count each row and the total. Point to each row and then gesture in a circle as you say 7 + 7 = 14. Have children echo you. To show a doubles-plus-1 fact, add a counter to one of the rows and repeat the process.

- **Advanced/Gifted:**
  - Children who are skilled with operations and have a strong number sense often enjoy math puzzles.
  - Addition squares are intriguing puzzles for advanced students. Introduce an addition square that requires adding different combinations of three numbers. Some children may enjoy creating their own addition squares for classmates to solve.

- **Topic 6**
  - **Below level students:**
    - Subtracting is often much more difficult than addition for young children. Review the subtraction facts to 12 with below level performers. This review will give children confidence in their ability to subtract.
    - Use counters or pictures to help children understand the connection between addition and subtraction.
  - **Students with special needs:**
    - Some children with special needs may not attend to the plus or minus sign. Color the signs two different colors to help children focus on the operation.
    - Use counters or pictures to help children solve subtraction facts to 20.

  - **ELL**
    - Repeated oral language practice of the strategies that are used in addition and subtraction to 20 will help English language learners understand the connection between addition and subtraction and master subtraction facts to 20.
    - **Emerging:** Children who are beginning to learn English can demonstrate their understanding of subtraction facts by using counters or by drawing pictures.
    - **Expanding:** As children solve subtraction facts to 20, ask them to name the related addition facts.
    - **Bridging:** Ask children with advanced English skills to describe their strategies for finding a difference when subtracting to 20.

  - **Advanced/Gifted:**

- Encourage children to solve real-life problems in the classroom involving addition and subtractions facts to 20. For example, they might calculate the number of materials needed to complete a craft project or the number of snacks left at the end of a party.
- Challenge children who have mastered the addition and subtraction facts to write as many equivalent forms as they can of the same number. For example, given the number 9, they may write: 16-7=9, 4+5=9, 15-6=9, 7+2=9, etc.

Integrated/Cross-Disciplinary Instruction

Language Arts and Reading: listening to trade books and reading leveled math concept readers; students can discuss the questions at the back of each book and answer the questions together

Topic 1: Literature: Discuss with class items they would find at an amusement park; students make up addition stories about the fair using their number as a total. (page 2)

T**opic 2: Art:** Have children write an addition story about 9 armadillos; illustrate their number stories. (page 40)

Topic 3: Art: Have children make number collages. Look through magazines to locate items to represent their number and cut it out. (page 90)

Topic 4: Social Studies: Children will look up the official plants and wildlife of their state; choose one and write a fact about it; illustrate their fact and write a number sentence. (page 116)

Topic 5: STEM: Children will talk about animals that people raise on ranches and farms; have questions prepared such as "How many babies do pigs have?", "How many eggs does a hen lay?" (page 162)

Topic 6: Social Studies: Children will research the capital of California; write subtraction facts to 20 on index cards; children write the subtraction fact and illustrate it. (page 204)

Science: counting buds, leaves and flowers on developing plants; comparing measurement of plants over time

Resources

Manipulatives: two-part pattern cards, counters, color tiles, connecting cubes, two-color counters, number cards 0 - 11, part-part-whole mat, blank mini ten frames, building blocks, number cube, double ten-frame mat, number cards 12 - 20, number tiles 0 - 9

Read Aloud Books: 2 of Everything, Math Appeal Mind Stretching Math Riddles,M&M Counting, Skittles Riddles, 12 Ways to Get to 11, Six Foolish Fisherman

Songs: "Five Little Ducks Went out to Play", "Ten Little Wallabies"

Playing Cards with picture cards removed to play the game "War"

Investigations: Number Games and Story Problems

Envision Math Grade 1 Teacher's Guide and Student book

Envision Math Practice Workbook (practice work and spiral review)

Envision Math Teacher's Resource Book: masters for enrichment, problem-solving, reteach activities; problem of the day

Envision On-line: student text; teacher's guide; enrichment, reteach, problem-solving and practice worksheets; on-line intervention and enrichment; Math Practice Animations, Visual Learning Animations, Topic Opener Videos, Animated Interactive Math Stories (www.pearsonrealize.com)

Envision Leveled Math Concept Readers

Topics Categories in book form:

Topic 1: Understanding Addition

Topic 2: Understanding Subtraction

Topic 3: Five and Ten Relationships

Topic 4: Addition and Subtraction Facts to 12

Topic 5: Addition Facts to 20

Topic 6: Subtraction Facts to 20

Master Enrichment pages

Master Reteaching pages

Master Practice pages

On-line Resources available at www.pearsonrealize.com

- Teacher Edition (TE) Textbook
- Student Edition (SE) Textbook
- Tests on line
- Concepts videos
- Math Tools

Math songs

21st Century 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.CRP4.1	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.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.