

Course Title: Mathematics	Full Year	Required
<p>Course Description: The big ideas in grade 2 include: extending understanding of the base-ten number system, building fluency with addition and subtraction, using standard units of measure, and describing and analyzing shapes. The mathematical work for grade 2 is partitioned into 9 units:</p> <ol style="list-style-type: none"> 1. Adding, Subtracting, and Working with Data 2. Adding and Subtracting within 100 3. Measuring Length 4. Addition and Subtraction on the Number Line 5. Numbers to 1,000 6. Geometry, Time, and Money 7. Adding and Subtracting within 1,000 8. Equal Groups 9. Putting it All Together <p>In these materials, particularly in units that focus on addition and subtraction, teachers will find terms that refer to problem types, such as Add To, Take From, Put Together or Take Apart, Compare, Result Unknown, and so on. These problem types are based on common addition and subtraction situations, as outlined in Table 1 of the Mathematics Glossary section of the Common Core State Standards.</p>		
<p>Additional Course Information:</p> <p>The big ideas in Grade 2 include:</p> <ul style="list-style-type: none"> ● Representing and solving problems involving addition and subtraction ● Adding and subtracting within 20 ● Understanding place value ● Using place value understanding and properties of operations to add and subtract ● Measuring and estimating lengths in standard units ● Relating addition and subtraction to length <p>Required fluency in grade 2 includes:</p> <ul style="list-style-type: none"> ● Single-digit sums and differences (sums from memory by end of Grade 2) ● Add/subtract within 100 	<p>Core Resources:</p> <p>Illustrative Mathematics</p> <p>Instructional Routines and Math Language Routines</p> <p>Glossary - Student-friendly</p> <p>Required Materials</p> <p>IM en Español</p> <p>Developing a Mathematical Community</p>	<p>Are there any attachments <u>at the course level</u> that teachers will need?</p> <p>Scope and Sequence This document should be reviewed at the start of the year and each unit for information on language routines, expectations, and possible misconceptions.</p> <p>Pacing Guide and Dependency Diagrams K-5</p>

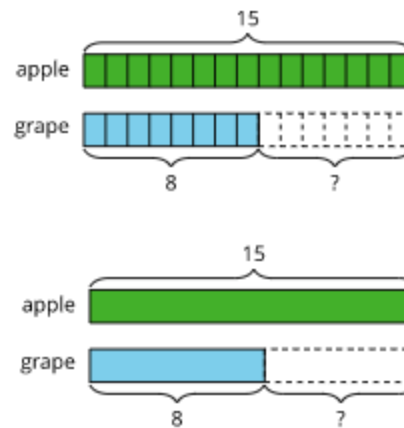
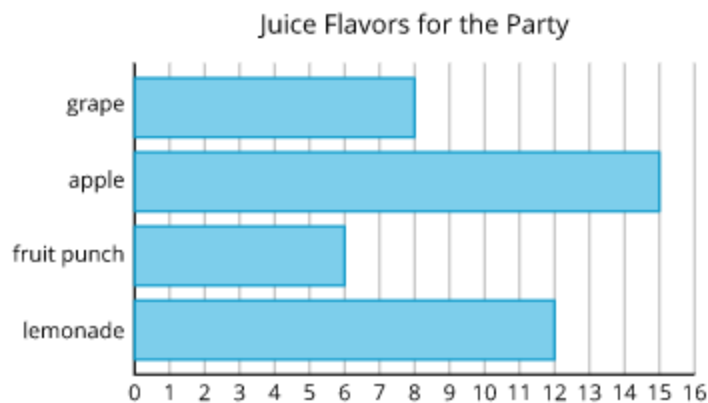
Unit 1: Adding, Subtracting, and Working with Data

Duration: 16-20 days

Unit Overview - FOCUS:

In this unit, students begin the year-long work to develop fluency with sums and differences within 20, building on concepts of addition and subtraction from grade 1. They learn new ways to represent and solve problems involving addition, subtraction, and categorical data.

Here, students are introduced to picture graphs and bar graphs as a way to represent categorical data. They ask and answer questions about situations described by the data. The structure of the bar graphs paves the way for a new representation, the tape diagram.



Students learn that tape diagrams can be used to represent and make sense of problems involving the comparison of two quantities. The diagrams also help to deepen students' understanding of the relationship between addition and subtraction.

This opening unit also offers opportunities to introduce mathematical routines and structures for centers, and to develop a shared understanding of what it means to do math and to be a part of a mathematical community.

Topic Titles:

- **Section A: Add and Subtract Within 20**
 - Build toward fluency with adding within 100
 - Build toward fluency with subtracting within 20
- **Section B: Ways to Represent Data**
 - Interpret picture and bar graphs
 - Represent data using picture and bar graphs
 - Solve one- and two-step problems using addition and subtraction within 20
- **Section C: Diagrams to Compare**
 - Make sense of and interpret tape diagrams
 - Represent and solve Compare problems with unknowns in all positions within 100

Coherence: How does this unit build on and connect to prior knowledge and learning?

In Kindergarten and first grade students learned the structures and routines for classroom lessons and centers. They created norms for classroom learning in order [to build a mathematical community](#). In grade 2, students will develop a shared understanding of what it means to be part of a mathematical community building off what they learned in grades 1 and kindergarten.

In grade 1, students added and subtracted within 20 using strategies based on properties of addition and place value. They developed fluency with sums and differences within 10. They built on their knowledge of structuring numbers to 5 in kindergarten and began to partition numbers within 20 and find all of the pairs of ten. In grade 2 students will use their partitions of 10 and known facts as a foundation to develop fluency with addition and subtraction. In kindergarten, students developed fluency with sums and differences within 5. In grade 2 students will build on this understanding to develop their fluency within 20. Students developed an understanding of the meaning of the equal sign. Students began to count on to add and used counting back and counting on as methods for subtracting. They saw subtraction as an unknown-addend problem and use their knowledge of addition to find the difference of two numbers. Previously students began to discover the relationship between addition and subtraction.

In grade 1, students also gained experience in collecting, organizing, and representing categorical data. Students used drawings, symbols, tally marks, and numbers to represent categorical data. They went further by choosing their own categories, interpreting representations with up to three categories, and asking and answering questions about the data.

In grade 1, students encountered a variety of problem types: Add to/Take From, Start Unknown, Change Unknown, Put Together/Take Apart, Unknowns in All Positions, and Compare, Difference Unknown. Students compare the structure of different types of story problems as they practiced adding and subtracting within 20. In grade 1, students use the relationship between addition and subtraction to solve and represent compare problems. They created diagrams and wrote equations to represent how they thought about the quantities within compare problems.

Essential Questions:

1. What are strategies for figuring out addition and subtraction facts within 20 that support building fluency?
2. How can picture graphs and bar graphs help us organize and make sense of data?

Enduring Understanding:

- **There are strategies for learning addition and subtraction facts within 20 that will help build fluency.** Using facts such as doubles and 5-plus can be useful for using known facts to figure out unknown facts as we work toward building fluency; making a ten by changing an 8 or a 9 to a 10 and subtracting 1 or 2 can be a useful strategy to support building fluency. As well, addition and subtraction have an inverse relationship that can be used to solve problems and unknowns can be used in all positions to solve problems.
- **Some questions can be answered by collecting and analyzing data.** Organizing data in graphs can help us to make sense of information. We can represent data visually in order to compare and make interpretations. The type of data determines the best type of visual representation. We can also use addition and subtraction to answer questions about data and see connections that we may not have before.

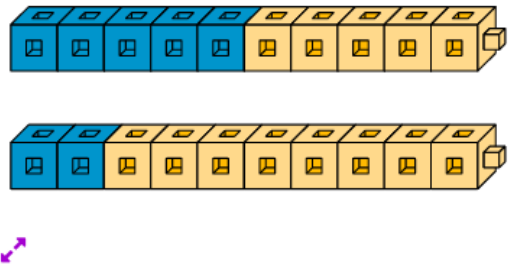
<p>What Students Will Know: This should be based on the competencies.</p> <ul style="list-style-type: none"> ● The number that makes 10 when added to a given number ● Addition and subtraction have an inverse relationship ● How to use manipulatives or make a drawing to show and explain the relationship between addition and subtraction ● Using the relationship between addition and subtraction can help you fluently add and subtract within 20 ● Strategies such as making a ten, decomposing numbers, and using related facts in order to add and subtract ● How to partition numbers within 20 ● How to collect and organize data in order to create a representation of the data ● The structures and common features of picture graphs and bar graphs (Bar graphs include a title, labels, numbers on the side, and bars to represent data. Picture graphs include a title, labels, and pictures or symbols.) ● The tape diagram is a representation that can be used by students to represent story problems. ● Types of compare problems and how to represent them using diagrams and equations with unknowns in different positions 	<p>What students will do: This should be based on the competencies.</p> <ul style="list-style-type: none"> ● Describe strategies for finding sums and differences ● Count on to add within 20 ● Use known facts such as doubles to figure out unknown facts ● Count back to and count up to subtract within 20 and use the relationship between addition and subtraction to subtract ● Use the make ten strategy to add and subtract ● Use what we know about the structure of whole numbers and the relationship of addition and subtraction to find the unknown numbers and explain their methods within 20 ● Find the number that makes equations true within 20 ● Add and subtract within 20 in a way that makes sense to them (Know from memory the sums of two one-digit numbers and fluently subtract by the end of grade 2) ● Collect data, answer questions, and discuss the need to represent data in an organized way ● Create their own representations of their data ● Construct picture and bar graphs using a scale, title, symbols/bars and labels ● Generate their own questions that can be answered using the data represented in a picture graph and bar graph ● Interpret picture graphs and bar graphs ● Use the structure of place value to add tens to tens and ones to ones ● Make sense of and interpret tape diagrams ● Use tape diagrams to solve compare problems with unknowns in different positions ● Represent and solve compare problems with unknowns in all positions within 100 	<p>Unit Specific Vocabulary:</p> <p>Academic vocabulary</p> <p>Equations Expression Value Sums Addend Unknown Represent Method/Strategy Data Interpret Organize Survey Picture graph Bar graph Features - Label, Title, Scale Categorical data Tape diagrams Representation</p>
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<p>Entry Level Assessment and Connection to Unit:</p> <p>Section A Pre-Unit Practice Problems Section B Pre-Unit Practice Problems Section C Pre-Unit Practice Problems</p>	<p>Unit Materials, Resources and Technology:</p> <ul style="list-style-type: none"> ● Illustrative Mathematics ● Instructional Routines and Math Language Routines ● Glossary - Student-friendly ● Required Materials ● IM en Español ● Pacing Guide and Dependency Diagrams K-5
<p>Opportunities for Interdisciplinary Connections: Pictures and bar graphs connect to science, as well as collecting data and organizing data with different representations.</p>	
<p>Any links, attachments and resources:</p> <p>Instructional Routines Document Family Support Materials</p>	<p>Planning Ideas:</p> <p>Components of a Typical IM Lesson What To Know About IM When Planning Where to Find the Mathematical Practices in the Units Assessing the Mathematical Practices</p>

Topic # 1 (Section A)	Topic Name: Section A - Adding and Subtracting Within 20	Duration: Recommended: 6 days (6 lessons)
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Topic Description:
 This opening section gives teachers opportunities to assess students’ fluency with addition and subtraction facts within 10 and how they approach adding and subtracting.

The first several lessons focus on making a ten as a strategy to add and subtract, which helps students gain fluency with facts within 20 and supports the work with larger numbers (such as composing and decomposing numbers as a way to add and subtract). In the last lesson of the section, students use strategies learned in grade 1 to add within 50.



$10 - 5 = \underline{\quad}$
 $5 + \underline{\quad} = 10$
 $2 + \underline{\quad} = 10$
 $10 - 8 = \underline{\quad}$

Some activities take place in centers, enabling teachers to also introduce routines and structures while helping students develop mental strategies for adding and subtracting.

Section Learning Goals

- Build toward fluency with adding within 100.
- Build toward fluency with subtracting within 20.

<p>Competencies Addressed:</p> <p>Understanding and Applying Number Systems 2.NS.4. I can use my understanding of place value and properties of operations to add. (2.NBT.B.5-9)</p> <p>Operations and Algebraic Thinking 2.OA.1 I can add within 20. (2.OA.B.2) 2.OA.2 I can subtract within 20. (2.OA.B.2)</p>	<p>Essential Question and Enduring Understanding Addressed in this Topic:</p> <p>Essential Question What are strategies for figuring out addition and subtraction facts within 20 that support building fluency?</p>
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	<p>Enduring Understanding</p> <ul style="list-style-type: none"> ● There are strategies for learning addition and subtraction facts within 20 that will help build fluency. Using facts such as doubles and 5-plus can be useful for using known facts to figure out unknown facts as we work toward building fluency; making a ten by changing an 8 or a 9 to a 10 and subtracting 1 or 2 can be a useful strategy to support building fluency. As well, addition and subtraction have an inverse relationship that can be used to solve problems and unknowns can be used in all positions to solve problems.
<p>In this Topic, students will know:</p> <ul style="list-style-type: none"> ● The number that makes 10 when added to a given number ● Addition and subtraction have an inverse relationship ● How to use manipulatives or make a drawing to show and explain the relationship between addition and subtraction ● Strategies such as making a ten, decomposing numbers, and using related facts in order to add and subtract ● How to partition numbers within 20 	<p>Topic Vocabulary:</p> <p>Academic vocabulary</p> <p>Equations Sums Addend Represent Method/strategy Value Expression Unknown</p>

In this Topic, students will be able to:

- Describe their method for finding sums and differences
- Use the make ten strategy to add and subtract
- Use what they know about the structure of whole numbers and the relationship of addition and subtraction to find the unknown numbers and explain their methods within 20
- Count on to add within 20
- Use known facts such as doubles to figure out unknown facts
- Count back to and count up to subtract within 20 and use the relationship between addition and subtraction to subtract
- Find the number that makes equations true within 20
- Add and subtract within 20 in a way that makes sense to them (know from memory the sums of two one-digit numbers and fluently subtract by the end of grade 2)
- Use the structure of place value to add tens to tens and ones to ones

Plan for Student Reflection:

[Student Journal Prompts and Reflection Practices](#)

Plan for Teacher Reflection:

Lesson 1: What do you love most about math? How are you sharing that joy with your students and encouraging them to think about what they love about math?

Lesson 2: How are you facilitating the creation of a productive mathematical community? Where can you point to evidence of this for students to see?

Lesson 3: What makes someone good at math? In what ways are you making assumptions about which of your students are good at math?

Lesson 4: By the end of grade 2, students must be fluent with addition and subtraction within 20, including knowing all sums of 2 one-digit numbers by memory. What did you learn about your students during today's activities that will help you prepare all students to meet this standard?

Lesson 5: In what ways is the math community you are working to foster going well? What actions can you take to continue to build community?

Lesson 6: How can you use what you learned today about your students and the structure of centers to implement centers in your upcoming lessons?

Utilize additional strategies for Teacher Reflection:

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| | <ul style="list-style-type: none">● Reviewing formative assessments● Developing scaffolds● Collaborative scoring● PLCs● Planning for small groups |
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Topic 1 Task Development

Task Title: Topic 1 - Add and Subtract Within 20	Grade Level and Unit: Grade 2, Unit 1
Description of Task: Students work together to use digit cards 0-9 to make addition and subtraction equations within 20 true. Each digit card may only be used one time.	Purpose of Task: To develop fluency for adding and subtracting within 20.
Background of Students/Learning Progression: Students developed an understanding of the meaning of the equal sign in grade 1. They can fluently add and subtract within 10. In this topic students built on their understanding of the structure of 10 to develop strategies to find the unknowns in all positions within 20. They are adding and subtracting within 20 in a way that makes sense to them and beginning to develop the most efficient strategy for them.	Ensure all competencies are addressed in the task: <input type="checkbox"/> Yes, all competencies are addressed <input type="checkbox"/> No - Task needs modification
Getting Started: In the lessons that make up Topic 1 - Section A of Unit 1, students will: <ul style="list-style-type: none">● Build toward fluency with adding within 100.● Build toward fluency with subtracting within 20. Lesson 1 (WARM UP) <ul style="list-style-type: none">● Lesson 1 Slides● Teacher Presentation Materials The purpose of this warm-up is to elicit ideas students have about doing math using the routine, “What Do You Know About _____?” This routine provides an opportunity for all students to contribute to the conversation and for the teacher to listen to what knowledge students already have. This begins to provide the foundation and necessary groundwork for building a productive mathematical community.	

Learning Cycle Model Process

Section A

IM Lesson	Lesson 1: Add and Subtract Within 10	Lesson 2: Relate Addition and Subtraction within 10	Lesson 3: Relate Addition and Subtraction within 20	Lesson 4: Add and Subtract Your Way	Lesson 5: Add Within 50	Lesson 6: Center Day 1 (optional)
Learning Cycle Model	Making Meaning	Making Meaning	Making Meaning	Investigate	Investigate	Create
Naugatuck Math Competency	2.OA.1, 2.OA.2	2.OA.1, 2.OA.2	2.OA.1, 2.OA.2	2.OA.1, 2.OA.2	2.NS.4	2.OA.1, 2.OA.2, 2.NS.4
Math Practice Standards	MP3	MP2, MP3, MP6, MP7	MP2	MP7	MP3, MP6	
Lesson Purpose	The purpose of this lesson is for students to add and subtract within 10.	The purpose of this lesson is for students to find the number that makes equations true and write addition and related subtraction equations within 10.	The purpose of this lesson is for students to find the number that makes equations true within 20.	The purpose of this lesson is for students to add and subtract within 20 in a way that makes sense to them.	The purpose of this lesson is for students to add within 50. Students find the value of sums within 50 in any way that makes sense to them.	The purpose of this lesson is for students to practice adding and subtracting within 10, 20, or 50.
Vocabulary Focus		Equation, sums	Addend, represent, unknown addend, expression	Method, strategy	value	
Lesson Materials/Resources	Lesson 1 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Chart paper to create poster Each group of 2 	Lesson 2 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> A tower of 10 connecting cubes to use in the 	Lesson 3 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs 10 connecting 	Lesson 4 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs a set of Number Cards (0-10) and a copy 	Lesson 5 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs a set of Number Cards (0-10) and a copy 	Lesson 6 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs a set of Number Puzzles Digit Cards and a

	<p>needs a set of Number Cards (0-10) (laminated for future lessons)</p> <ul style="list-style-type: none"> Each student needs access to connecting cubes <p>Activity 2:</p> <ul style="list-style-type: none"> Each student needs access to connecting cubes <p>Cool Down: Sums and Differences</p>	<p>launch.</p> <ul style="list-style-type: none"> Each group of 2 needs 10 connecting cubes and a copy of What's Behind My Back Stage 2 Recording Sheet Grade 1 <p>Cool-down: Represent the Cubes</p>	<p>cubes and a copy of What's Behind My Back Stage 3 Recording Sheet</p> <p>Activity 2:</p> <ul style="list-style-type: none"> Different groups of 2 from Activity 1 Access to connecting cubes <p>Cool-down: Which Equations Are True?</p>	<p>of How Close? Stage 1 Recording Sheet</p> <p>Activity 2:</p> <ul style="list-style-type: none"> Each group of 2 needs access to connecting cubes <p>Cool-down: Sums and Differences</p>	<p>of How Close? Stage 3 Recording Sheet</p> <p>Activity 2:</p> <ul style="list-style-type: none"> Each group of 2 needs access to connecting cubes in towers of 10 and singles. <p>Cool-down: What's the Value of the Sum?</p>	<p>Number Puzzles Addition and Subtraction Stage 2 Gameboard</p> <p>Activity 2:</p> <ul style="list-style-type: none"> Each group of 2 needs a set of Number Cards (0-10) Center Choice (see below)
Assessment	<p>Formative Assessment Strategies: observation, questioning, student discourse : Monitoring Sheet See Section A Checkpoint Assessment, Section A Checkpoint Teacher's Guide</p>					
						<p>Section A Practice Problems</p>
Centers Materials	<p>Number Puzzles: Addition and Subtraction (1-4), Stage 1: Within 10 (Supporting)</p>	<p>Number Puzzles: Addition and Subtraction (1-4), Stage 1: Within 10 (Supporting)</p>	<p>Number Puzzles: Addition and Subtraction (1-4), Stage 1: Within 10 (Supporting)</p>	<p>Number Puzzles: Addition and Subtraction (1-4), Stage 1: Within 10 (Supporting)</p>	<p>Number Puzzles: Addition and Subtraction (1-4), Stage 1: Within 10 (Supporting)</p>	<p>What's Behind My Back, Stages 2 and 3</p> <p>How Close, Stages 1–3</p> <p>Number Puzzles, Stages 1 and 2</p>

Making Meaning:

In Lesson 1, students find the values of sums and differences and how they describe their methods to others. There may be sums and differences students say they "just know."

In Lesson 2, In this lesson, students revisit a center activity, What's Behind My Back, and use connecting cubes to elicit their understanding of sums that have a value of 10 and the relationship between addition and subtraction. Students will continue practice recognizing and using these sums in lesson activities throughout the unit.

In Lesson 3, students apply the reasoning they used in previous lessons with addends that make 10 to find the number that makes an equation true that include the number 20. In the first activity, students learn stage 3 of the What's Behind My Back center in which they work with 20 cubes, organized into two towers of 10 cubes. In the second activity, students find the number that makes different equations with addition and subtraction expressions true. Throughout the lesson, students have opportunities to use what they know about the structure of whole numbers and the relationship of addition and subtraction to find the unknown numbers and explain their methods.

Lesson 1: [Add and Subtract Within 10](#) (Activity 1 and Activity 2)

- The purpose of this lesson is for students to add and subtract within 10
- [Lesson 1 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 2: [Relate Addition and Subtraction within 10](#)

- The purpose of this lesson is for students to find the number that makes equations true and write addition and related subtraction equations within 10.
- [Lesson 2 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 3: [Relate Addition and Subtraction within 20](#)

- The purpose of this lesson is for students to find the number that makes equations true within 20.
- [Lesson 3 Slides](#)
- [Teacher Presentation Materials](#)

Investigation:

In Lesson 4, the work builds from grade 1, where students find sums and differences within 20 with different strategies.

In Lesson 5, students find the value of sums with larger addends. Students look for and make use of the structure of place value to add tens to tens and ones to ones.

Lesson 4: [Add and Subtract Your Way](#)

- The purpose of this lesson is for students to add and subtract within 20 in a way that makes sense to them.
- [Lesson 4 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 5: [Add Within 50](#)

- The purpose of this lesson is for students to add within 50. Students find the value of sums within 50 in any way that makes sense to them.
- [Lesson 5 Slides](#)
- [Teacher Presentation Materials](#)

Create and Produce:

In Lesson 6, students have the opportunity for extra practice adding and subtracting within 10, 20, or 50.

Lesson 6: [Center Day 1 \(optional\)](#)

- The purpose of this lesson is for students to practice adding and subtracting within 10, 20, or 50.
- [Lesson 6 Slides](#)
- [Teacher Presentation Materials](#)

Communicate and Present:

In Lesson 6, Activity 1, students will use digit cards to create equations that are true.

Students share responses to the following questions, “Which equation would you start with? Why would you start there?”

Reflection:

“Today we chose activities to work on and worked with a partner during center time.”

Math Community

Display chart from previous lesson and read the norms to students.

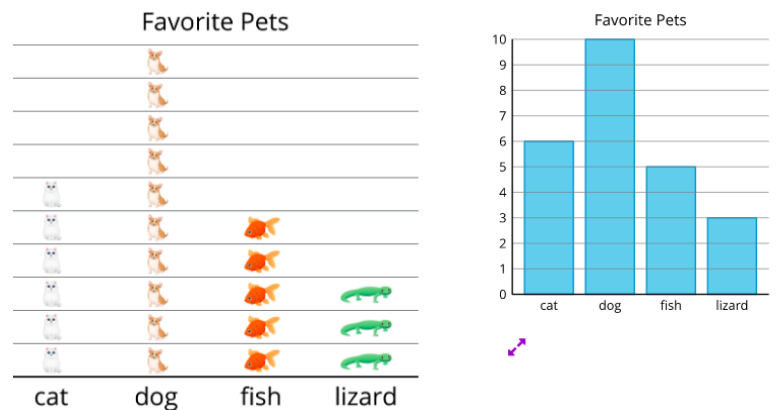
“What went well? What can we continue to work on?”

Notes: Follow all lessons in numerical order.

Complete File with Resources and Task:

Topic # 2 (Section B)	Topic Name: Section B - Ways to Represent Data	Duration: Recommended 6 days (6 lessons)
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Topic Description:
 In this section, students explore situations and problems that involve categorical data and learn new ways to represent such data. Students begin by representing data about their class in a way that makes sense to them. Then, they are introduced to picture graphs and bar graphs. Students learn the conventions of these graphs as they create them. They discuss the types of questions that can be asked and answered by the graphs, including those that require combining and comparing different categories.



Section Learning Goals:

- Interpret picture and bar graphs.
- Represent data using picture and bar graphs.
- Solve one- and two-step problems using addition and subtraction within 20.

Competencies Addressed:
Understanding and Applying Number Systems
2.NS.4 I can use my understanding of place value and properties of operations to add. (2.NBT.B.5-9)

Operations and Algebraic Thinking
2.OA.1 I can add within 20. (2.OA.B.2)
2.OA.2 I can subtract within 20. (2.OA.B.2)

Measurement and Data Investigations

Essential Question and Enduring Understanding Addressed in this Topic:

Essential Question

- How can picture graphs and bar graphs help us organize and make sense of data?

<p>2.MD.4 I can represent and interpret data. (2.MD.D.9-10)</p>	<p>Enduring Understanding</p> <ul style="list-style-type: none"> ● Some questions can be answered by collecting and analyzing data. Organizing data in graphs can help us to make sense of information. We can represent data visually in order to compare and make interpretations. The type of data determines the best type of visual representation. We can also use addition and subtraction to answer questions about data and see connections that we may not have before.
<p>In this Topic, students will know:</p> <ul style="list-style-type: none"> ● How to collect and organize data in order to create a representation of the data ● The structures and common features of picture graphs and bar graphs ● Bar graphs include a title, labels, numbers on the side, and bars to represent their data. ● Picture graphs include a title, labels, and pictures or symbols 	<p>Topic Vocabulary:</p> <p>Academic vocabulary</p> <p>Data Survey Interpreting Organizing Picture graph Bar graph Features - Label, Title, Scale Categorical data</p>

In this Topic, students will be able to:

- Interpret picture and bar graphs
- Collect data, answer questions, and discuss the need to represent data in an organized way
- Create their own representations of their data
- Construct picture and bar graphs using a scale, title, and labels
- Generate their own questions that can be answered using the data represented in a picture graph and bar graph
- Interpret picture graphs and bar graphs

Plan for Student Reflection:

[Student Journal Prompts and Reflection Practices](#)

Plan for Teacher Reflection:

Lesson 7: In grade 1, students organized and represented data with up to three categories. How did you see or hear students demonstrate their understanding of different ways to organize data?

Lesson 8: Reflect on who participated in math class today. What assumptions are you making about those who did not participate? How can you leverage each of your students' ideas to support them in being seen and heard in tomorrow's math class?

Lesson 9: The scale of the bar graph will be important as students solve problems based on data. How did you see students using the scale on the bar graph today?

Lesson 10: What was the best question you asked students today? Why would you consider it the best one based on what students said or did?

Lesson 11: What aspects of today's lesson allowed each of your students to see themselves as productive mathematical reasoners?

Lesson 12: Reflect on how comfortable your students are asking questions of you and of each other. What can you do to encourage students to ask questions?

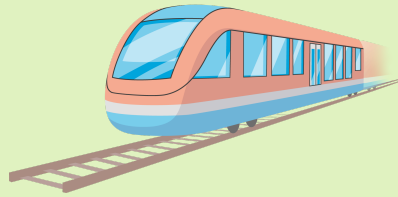
Utilize additional strategies for Teacher Reflection:

- Reviewing formative assessments
- Developing scaffolds
- Collaborative scoring
- PLCs
- Planning for small groups

Topic 2 Task Development

Task Title: Topic 2 - Ways to Represent Data	Grade Level and Unit: Grade 2, Unit 1
Description of Task: Students will create their own picture graphs and bar graphs to represent data. After drawing their own graphs, they share their graph with a partner and receive feedback on what is clear and what they could improve. As students represent the data and share their graphs with others, they notice and describe the features of picture graphs and bar graphs that make it easy for others to understand (MP3, MP6). While students are making their graphs, monitor for any features that students leave out (for example, titles, category labels and symbols/pictures in their picture graph and a title, numbers on the side, labels, and bars to represent data for their bar graphs.)	Purpose of Task: The purpose of this task is for students to attend to the features of picture graphs and bar graphs as they represent a given set of categorical data in picture graphs and bar graphs. They will discover the similarities and differences between picture graphs and bar graphs. They will also discover the importance of creating well-organized clear graphs so that others can make meaning from them.
Background of Students/Learning Progression: In grade 1, students gained experience in collecting, organizing, and representing categorical data. Students used drawings, symbols, tally marks, and numbers to represent categorical data. They went further by choosing their own categories, interpreting representations with up to three categories, and asking and answering questions about the data. In previous lessons in grade 2 students interpreted bar graphs and picture graphs and learned about the features of each. In the next lesson students will generate their own questions about the data represented in the graphs that they created. The work of this lesson connects to upcoming lessons as students move from a discrete representation of numbers with the picture graph to a continuous representation of numbers with the bar graph. From there, students create their own surveys and find a way to organize their data in a graph. They will use bar graphs to help them understand tape diagrams in later lessons.	Ensure all competencies are addressed in the task: <ul style="list-style-type: none"><input type="checkbox"/> Yes, all competencies are addressed<input type="checkbox"/> No - Task needs modification
Getting Started: Lesson 7 (Warm Up) <ul style="list-style-type: none">• Lesson 7 Slides• Teacher Presentation Materials Invite students to notice and wonder about pictures of transportation that will be used later in the lesson. They may notice that all the pictures are forms of transportation that people in the community use to get around. This leads into the next activity, in which students collect data about how they got to school.	

What do you notice? What do you wonder?



Learning Cycle Model Process

Section B

IM Lesson	Lesson 7: Collect and Represent Data	Lesson 8: Interpret Picture Graphs	Lesson 9: Interpret Bar Graphs	Lesson 10: Represent Data Using Picture Graphs and Bar Graphs	Lesson 11: Questions About Data	Lesson 12: Center Day 2 (optional)
Learning Cycle Model	Making Meaning	Making Meaning	Making Meaning	Investigate	Investigate	Create and Produce
Naugatuck Math Competency	2.MD.4	2.MD.4	2.MD.4	2.MD.4	2.OA.1, 2.OA.2, 2.MD.4	2.OA.1, 2.OA.2, 2.NS.4, 2.MD.4
Math Practice Standards	MP5	MP7	MP2, MP3	MP3, MP6	MP7	MP2, MP6
Lesson Purpose	The purpose of this lesson is to elicit and build on students' previous understandings and experiences with organizing and representing data.	The purpose of this lesson is for students to read and interpret a picture graph, which is a standard way of representing data.	The purpose of this lesson is for students to interpret data in a bar graph in order to answer questions.	The purpose of this lesson is for students to attend to the features of picture graphs and bar graphs as they represent a given set of categorical data in picture	The purpose of this lesson is for students to ask and answer questions about a given set of categorical data represented in picture and bar graphs.	The purpose of this lesson is for students to practice organizing data and using graphs to represent it. Students also practice adding and subtracting within 10, 20, or 50.

				graphs and bar graphs.		
Vocabulary Focus	Data, interpreting, organizing, “how many”, survey	Picture graph, scale	Bar graph, scale	Features, Categorical data, label, title		
Lesson Materials/ Resources	Lesson 7 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Chart paper Each student needs scissors, access to tape, and a copy of How We Get to School Activity 2: <ul style="list-style-type: none"> Each group of 2 needs access to extra copies of How We Get to School, glue, markers, scissors, tape, and stickers. Cool-down: Organize Data	Lesson 8 Slides Teacher Presentation Materials Student Pages No additional materials needed Cool-down: Use a Picture Graph	Lesson 9 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Groups of 3 Activity 2: <ul style="list-style-type: none"> Groups of 2 Cool-down: Animals at the Zoo	Lesson 10 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each student needs 1 data table from Data Table (may receive different data tables) Activity 2: <ul style="list-style-type: none"> Each student needs a copy of Picture and Bar Graph Template **Save this work for L11 Cool-down: Fruits We Love Graphs	Lesson 11 Slides Teacher Presentation Materials Student Pages Activities 1 and 2: <ul style="list-style-type: none"> Work from Lesson 10 Activity 2 Cool-down: Questions About Data	Lesson 12 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs a collection of 20–30 objects that could be sorted into at least 3 categories. (pattern blocks, cubes, sets of books, or a combination of blocks, cubes, and counters) Each group needs a copy of Sort and Display Stage 2 Recording Sheet Activity 2: <ul style="list-style-type: none"> Centers - see below
	Formative Assessment Strategies: observation, questioning, student discourse : Monitoring Sheet					

	See Section B Checkpoint Assessment , Section B Checkpoint Teacher's Guide					
						Section B Practice Problems
Centers Materials	How Close? (1–5) , Stage 3: Add to 100 (Addressing) Sort and Display (1–3) , Stage 1: Any Way (Supporting)	How Close? (1–5) , Stage 3: Add to 100 (Addressing) Sort and Display (1–3) , Stage 1: Any Way (Supporting)	How Close? (1–5) , Stage 3: Add to 100 (Addressing) Sort and Display (1–3) , Stage 1: Any Way (Supporting)	Shake and Spill (K–2) , Stage 5: Cover (up to 20) (Addressing) Sort and Display (1–3) , Stage 1: Any Way (Supporting)	Shake and Spill (K–2) , Stage 5: Cover (up to 20) (Addressing) Sort and Display (1–3) , Stage 1: Any Way (Supporting)	What's Behind My Back , Stages 2 and 3 How Close , Stages 1–3 Number Puzzles , Stages 1 and 2

Making Meaning

In Lesson 7, students collect data about their class, answer questions, discuss the need to represent data in an organized way, and create their own representations of their data. Throughout the lesson monitor for the different ways students choose to organize and represent the data and ask them about the decisions they make. In upcoming lessons, students learn how to interpret and represent data using picture and bar graphs.

In Lesson 8, students make sense of the structure and features of a picture graph as they consider what they can learn from a picture graph and the types of questions a picture graph can and cannot be used to answer. They use picture graphs to answer questions about how many are in a category as well as questions that ask them to combine or compare categories.

In Lesson 9, In this lesson, bar graphs are introduced as another way to represent categorical data. Students compare the features of bar graphs to picture graphs and use the unique features of bar graphs to interpret data and answer questions. When students relate the data to the context it represents and carefully interpret the elements of a graph, they reason abstractly and quantitatively and attend to precision.

Lesson 7 : [Collect and Represent Data](#)

- The purpose of this lesson is to elicit and build on students' previous understandings and experiences with organizing and representing data.
- [Lesson 7 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 8: [Interpret Picture Graphs](#)

- The purpose of this lesson is for students to read and interpret a picture graph, which is a standard way of representing data.
- [Lesson 8 Slides](#)

- [Teacher Presentation Materials](#)

Lesson 9: [Interpret Bar Graphs](#)

- The purpose of this lesson is for students to interpret data in a bar graph in order to answer questions.
- [Lesson 9 Slides](#)
- [Teacher Presentation Materials](#)

Investigation:

In Lesson 10, students are introduced to the idea of using one symbol in a picture graph rather than a picture based on the category. They may find it easier and more efficient to use a symbol when drawing their graphs.

In Lesson 11, students generate their own questions about the data represented in the graphs they created in the previous lesson. They use their classmates' picture graphs and bar graphs to answer student-generated questions about the data. Throughout the lesson, students have opportunities to share and revise their work with different peers. These conversations help to deepen their understanding of the structure of picture and bar graphs and the features that help clearly communicate data

In Lesson 12, Activity 1, students learn stage 2 of the Sort and Display center, which was first introduced in grade 1. In this new stage, called Picture or Bar Graphs, students sort 20–30 objects into 3 categories and make a picture or bar graph that shows how they sorted. In Activity 2, students choose between two previously introduced centers focused addition and subtraction.

Lesson 10: [Represent Data Using Picture Graphs and Bar Graphs](#)

- The purpose of this lesson is for students to attend to the features of picture graphs and bar graphs as they represent a given set of categorical data in picture graphs and bar graphs.
- [Lesson 10 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 11: [Questions About Data](#)

- The purpose of this lesson is for students to ask and answer questions about a given set of categorical data represented in picture and bar graphs.
- [Lesson 11 Slides](#)
- [Teacher Presentation Materials](#)

Create and Produce:

Lesson 12: [Center Day 2 \(optional\)](#)

- The purpose of this lesson is for students to practice organizing data and using graphs to represent it. Students also practice adding and subtracting within 10, 20, or 50.
- [Lesson 12 Slides](#)
- [Teacher Presentation Materials](#)

Communicate and Present:

Lesson 10 Activity 1 and Activity 2

After students create their picture graph and bar graph they will present their graphs to the class. Students will share the similarities and differences between the features of picture graphs and bar graphs by describing what it was like to draw each type of graph. Students will share their graphs with others and compare the different features they include to make their data clear to others. Partners and/or classmates will give feedback on what is clear and what they could improve through a partner share or a gallery walk.

Some questions to ask:

“How did you know how high to make each bar in your graph?” (I knew 8 people liked math best, so I found 8 on the side and shaded in from that line down.)

“How was drawing a bar graph like drawing a picture graph? How was it different?” (Just like picture graphs we had to use labels and titles and make sure the numbers matched. It was different because we didn't have to draw different pictures, we could just use the scale and draw towers to match. In a bar graph you have to write the numbers on the side.)

MLR8 Discussion Supports

- Display sentence frames.
- “You did _____ really well in your graph.”
- “Why did you . . . ?”
- “Can you say more about . . . ?”

Reflection:

“Today you made picture graphs and bar graphs to represent data.”

“What is something new about graphs that you learned today?”

“What is something new that you learned from working with your partner?”

“How did you revise your graph today to make it easier for someone else to understand the data?”

“Tomorrow you will use your graphs to write questions for your classmates to answer and have the chance to answer their questions based on the graphs.”

Notes: Follow all lessons in numerical order.

Complete File with Resources and Task:

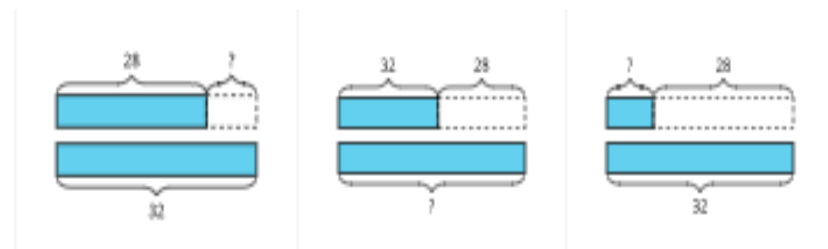
Topic # 3 (Section C)	Topic Name: Section C - Diagrams to Compare	Duration: 6 Lessons (6 days) 1 additional day for End of Unit Assessment
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Topic Description:

Students have previously represented and reasoned about quantities in story problems. In grade 1, students compared quantities using diagrams with discrete partitions. In the previous section, they reasoned about quantities in bar graphs. Here, students learn to use tape diagrams as another way to make sense of the relationship between two quantities and between addition and subtraction.

Students explore Compare story problems with an unknown difference, an unknown larger number, or an unknown smaller number. Tape diagrams help students to visualize these structures and support them in reasoning about strategies to use to solve problems, such as counting on or counting back. The table highlights the different types of problems in this section.

difference unknown	bigger unknown	smaller unknown
Lin counted 28 boats. Diego counted 32 boats. How many more boats did Diego count?	Lin found 28 more shells than Diego. Diego found 32 shells. How many shells did Lin find?	Lin saw 32 starfish. Diego saw 28 fewer starfish than Lin. How many starfish did Diego see?



Students also write equations to reason about questions that ask “how many more?” and “how many less?” They recognize that different equations and diagrams can be used to represent the same difference between two numbers.

Section Learning Goals

- Make sense of and interpret tape diagrams.

- Represent and solve Compare problems with unknowns in all positions within 100.

Competencies Addressed:

Understanding and Applying Number Systems

2.NS.2 I can count, read, and write whole numbers. (2.NBT.A.2-3)

2.NS.4. I can use my understanding of place value and properties of operations to add. (2.NBT.B.5-9)

Operations and Algebraic Thinking

2.OA.1 I can add within 20. (2.OA.B.2)

2.OA.2 I can subtract within 20. (2.OA.B.2)

2.OA.3 I can represent and solve problems involving addition and subtraction. **(2.OA.A.1)**

Measurement and Data Investigations

2.MS.4 I can represent and interpret data. (2.MD.D.9-10)

Essential Question and Enduring Understanding Addressed in this Topic:

Essential Question

- How can picture graphs and bar graphs help us organize and make sense of data?

Enduring Understanding

- **Some questions can be answered by collecting and analyzing data.**
Organizing data in graphs can help us to make sense of information. We can represent data visually in order to compare and make interpretations. The type of data determines the best type of visual representation. We can also use addition and subtraction to answer questions about data and see connections that we may not have before.

In this Topic, students will know:

- How to collect and organize data in order to create a representation of the data
- Identify the structures and common features of picture graphs and bar graphs (Bar graphs include a title, labels, numbers on the side, and bars to represent their data. Picture graphs include a title, labels, and pictures or symbols.)
- The tape diagram is a representation that can be used by students to represent story problems.
- Types of compare problems and how to represent them using diagrams and equations with unknowns in different positions

Topic Vocabulary:

Academic vocabulary

Tape diagram
Representation
Survey

<p>In this Topic, students will be able to:</p> <ul style="list-style-type: none"> ● Collect and organize data in order to create their own picture graphs and bar graphs ● Construct picture and bar graphs using a scale, title, and labels ● Generate their own questions that can be answered using the data represented in a picture graph and bar graph ● Interpret picture graphs and bar graphs ● Use the structure of place value to add tens to tens and ones to ones ● Make sense of and interpret tape diagrams. ● Use tape diagrams to solve compare problems with unknowns in different positions ● Represent and solve compare problems with unknowns in all positions within 100 	<p>Plan for Student Reflection:</p> <p>Student Journal Prompts and Reflection Practices</p> <hr/> <p>Plan for Teacher Reflection:</p> <p>Lesson 13: How does the work with the bar graphs today help build students’ understanding of this more abstract tape diagram?</p> <p>Lesson 14: The relationship between addition and subtraction is important as students develop fluency within 20 in grade 2. How did you use the tape diagram to help students build this understanding?</p> <p>Lesson 15: As students worked in their small groups today, whose ideas were heard, valued, and accepted? How can you adjust the group structure in future lessons to ensure each student’s ideas are a part of the collective learning?</p> <p>Lesson 16: What connections did students make between story problem contexts and the placement of the question mark in tape diagrams? How are students using tape diagrams to make sense of Compare problems?</p> <p>Lesson 17: What did students show you they understand about place value in today’s lesson? How can you use what you learned today about your students in your upcoming lessons?</p>

Lesson 18: Reflect on how you can reinforce the work done in today's lesson outside of math class. When can you ask students questions involving organizing or interpreting categorical data? How can you incorporate this work into other subject areas, such as science or social studies?

Utilize additional strategies for Teacher Reflection:

- Reviewing formative assessments
- Developing scaffolds
- Collaborative scoring
- PLCs
- Planning for small groups

Topic 3 Task Development

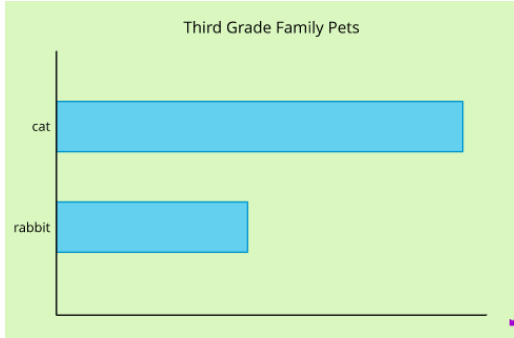
Task Title: Topic 3 - Diagrams to Compare	Grade Level and Unit: Grade 2, Unit 1
Description of Task: Students will create a survey, collect and organize their data, and represent their data as a picture or bar graph. Students can participate in a gallery walk to see their classmates' graphs. Next students will create their own relevant mathematical questions and use their understanding of addition and subtraction to answer questions about their own and their peers' survey data. Then students will analyze what they have learned from the data and representations in the previous activities and share their findings. In this activity, students select two things they learned and illustrate them using a tape diagram.	Purpose of Task: The purpose of this task is for students to use what they have learned about data, bar graphs, and tape diagrams to create a survey and to organize, collect, and represent data. Students use their understanding of adding and subtracting to ask and answer questions related to the data.
Background of Students/Learning Progression: In previous lessons, students analyzed and represented categorical data using picture and bar graphs. They generated statements, expressions, and equations based on the data in graphs and other displays. Students have created picture graphs and bar graphs in previous lessons when given the data. In this task students will collect and organize their own data in order to create their graphs. In this lesson, students work in pairs to create their own survey question, collect categorical data, organize their data, and represent their findings with a bar graph or picture graph. Students are invited to represent comparisons with a tape diagram and equation that reflect what they learned about their classmates from their data. This lesson supports the development of mathematical modeling skills by providing students opportunities to make choices about their approach for collecting data, determine appropriate equations to represent the situation, and choose ways to best represent their analysis (MP4).	Ensure all competencies are addressed in the task: <ul style="list-style-type: none"><input type="checkbox"/> Yes, all competencies are addressed<input type="checkbox"/> No - Task needs modification
Getting Started:	

Lesson 13 Activity 1

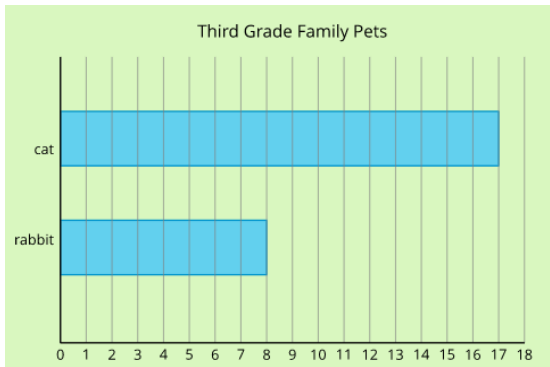
- [Lesson 13 Slides](#)
- [Teacher Presentation Materials](#)

In upcoming lessons, students will use bar graphs to make sense of tape diagrams that represent Compare problems.

A group of third grade students were asked, "What pets do you have?" Their responses are shown in the bar graph. What do you notice? What do you wonder?



Their responses are also shown in this bar graph.



How many more students have cats than have rabbits? Show two ways to find the difference.

Learning Cycle Model Process
Section C

IM Lesson	Lesson 13: Use Bar Graphs to Compare	Lesson 14: Use Diagrams to Compare	Lesson 15: Diagrams with All Kinds of Compare Problems	Lesson 16: Solve All Kinds of Compare Problems	Lesson 17: Center Day 3 (optional)	Lesson 18: Class Surveys (optional)
Learning Cycle Model	Making Meaning	Making Meaning	Making Meaning	Investigate	Investigate	Create
Naugatuck Math Competency	2.OA.1, 2.OA.2, 2.MD.4	2.MD.4	2.OA.1, 2.OA.2, 2.OA.3	2.OA.1, 2.OA.2, 2.OA.3	2.NS.2, 2.NS.4, 2.MD.4	
Math Practice Standards	MP2, MP5, MP7	MP2, MP6, MP7	MP2, MP7	MP1, MP2, MP7	MP7	
Lesson Purpose	The purpose of this lesson is for students to make sense of and solve Compare problems using the structure of a bar graph and equations.	The purpose of this lesson is for students to use their understanding of bar graphs to interpret tape diagrams and solve Compare problems with the difference unknown within 20.	The purpose of this lesson is for students to connect Compare problems with unknowns in all positions to tape diagrams.	The purpose of this lesson is for students to solve Compare problems with an unknown in all positions.	The purpose of this lesson is for students to count large groups of objects by creating smaller groups of 5 or 10. Students practice adding within 50 or representing data with graphs.	The purpose of this lesson is for students to use what they have learned about data, bar graphs, and tape diagrams to create a survey and to organize, collect, and represent data.
Vocabulary Focus	Tape diagrams	Diagram, representation				
Lesson Materials/Resources	Lesson 13 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> No additional materials 	Lesson 14 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each student needs a copy of 	Lesson 15 Slides Teacher Presentation Materials Student Pages Activity 2: <ul style="list-style-type: none"> Each group of 2 needs a set of 	Lesson 16 Slides Teacher Presentation Materials Student Pages No additional materials needed	Lesson 17 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Each group of 2 needs a collection of 100–120 objects. 	Lesson 18 Slides Teacher Presentation Materials Student Pages Activity 1: <ul style="list-style-type: none"> Give each student colored pencils and a copy of Picture

	<p>Activity 2:</p> <ul style="list-style-type: none"> No additional materials <p>Cool-down: Second Grade Absences</p>	<p>Party Time, scissors, and tape or glue.</p> <p>Activity 2:</p> <ul style="list-style-type: none"> Students need materials from Activity 1 <p>Cool-down: Dogs at the Pet Shop</p>	<p>Card Sort: At the Beach</p> <p>Cool-down: At the Beach</p>	<p>Cool-down: Compare the Pages</p>	<ul style="list-style-type: none"> Each student needs a copy of Counting Collections Stage 3 Recording Sheet and 10-Frame Standard <p>Activity 2:</p> <ul style="list-style-type: none"> Center choice - see below for materials 	<p>and Bar Graph Template</p>
Assessment	<p>Formative Assessment Strategies: observation, questioning, student discourse : Monitoring Sheet See Section C Checkpoint Assessment, Section C Checkpoint Teacher’s Guide Unit 1 Assessment, End of Unit 1 Assessment Teacher Guide</p>					
						Section C Practice Problems
Centers Materials	<p>Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)</p> <p>Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)</p>	<p>Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)</p> <p>Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)</p>	<p>Number Puzzles: Addition and Subtraction (1–4), Stage 2: Within 20 (Addressing)</p> <p>Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)</p> <p>Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)</p>	<p>Number Puzzles: Addition and Subtraction (1–4), Stage 2: Within 20 (Addressing)</p> <p>Shake and Spill (K–2), Stage 5: Cover (up to 20) (Supporting)</p> <p>Sort and Display (1–3), Stage 2: Picture or Bar Graphs (Addressing)</p>	<p>What's Behind My Back, Stages 2 and 3</p> <p>How Close, Stages 1–3</p> <p>Number Puzzles, Stages 1 and 2</p> <p>Sort and Display, Stage 2</p>	
Making Meaning						

In Lesson 13, students interpret bar graphs and use their visual structure to compare quantities. They write equations to represent comparisons and connect these equations to the structure of the bar graph (MP2). In upcoming lessons, students will use bar graphs to make sense of tape diagrams that represent Compare problems.

In Lesson 14, students use their understanding of bar graphs to make sense of a new representation, the tape diagram. The tape diagram is a representation that can be used by students to represent story problems. Students will use tape diagrams in grade 2 and throughout elementary, middle, and high school.

In Lesson 15, students continue to make sense of tape diagrams as they connect them to story problems. The story problems in this lesson include Compare problems with an unknown difference, an unknown larger number, or an unknown smaller number. Because these problem types are familiar from grade 1, students also begin to work with numbers within 100 in this lesson. This gives students an opportunity to notice how the tape diagram can be used to quickly visualize story problems with larger quantities. Students use tape diagrams to make sense of Compare problems. When students connect situations, tape diagrams, and equations, they deepen their understanding of the problem type and develop strategies they can use to make sense of and persevere in solving these problems in future lessons (MP1, MP2).

Lesson 13: [Use Bar Graphs to Compare](#)

- The purpose of this lesson is for students to make sense of and solve Compare problems using the structure of a bar graph and equations.
- [Lesson 13 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 14: [Use Diagrams to Compare](#)

- The purpose of this lesson is for students to use their understanding of bar graphs to interpret tape diagrams and solve Compare problems with the difference unknown within 20.
- [Lesson 14 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 15: [Diagrams with All Kinds of Compare Problems](#)

- The purpose of this lesson is for students to connect Compare problems with unknowns in all positions to tape diagrams.
- [Lesson 15 Slides](#)
- [Teacher Presentation Materials](#)

Investigation:

In Lesson 16, students may look for ways to compose a ten or subtract multiples of ten when finding unknown values within 100. Students will subtract numbers other than multiples of ten within 100 in future lessons. Encourage students to use a tape diagram to make sense of the problem if it is helpful.

In Lesson 17, in Activity 1, students revisit stage 3 of the Counting Collections, which was first introduced in Kindergarten. In this stage, called Estimate and Count Up to 120, students count collections of up to 120 objects and represent how they counted. In Activity 2, students choose between two previously introduced centers focused on adding and subtracting within 50 or representing data with graphs.

Lesson 16: [Solve All Kinds of Compare Problems](#)

- The purpose of this lesson is for students to solve Compare problems with an unknown in all positions.
- [Lesson 16 Slides](#)
- [Teacher Presentation Materials](#)

Lesson 17: [Center Day 3 \(optional\)](#)

- The purpose of this lesson is for students to count large groups of objects by creating smaller groups of 5 or 10. Students practice adding within 50 or representing data with graphs.
- [Lesson 17 Slides](#)
- [Teacher Presentation Materials](#)

Create and Produce:

In previous lessons, students analyzed and represented categorical data using picture and bar graphs. They generated statements, expressions, and equations based on the data in graphs and other displays. In Lesson 18, students work in pairs to create their own survey question, collect categorical data, organize their data, and represent their findings with a bar graph or picture graph. Students are invited to represent comparisons with a tape diagram and equation that reflect what they learned about their classmates from their data. This lesson supports the development of mathematical modeling skills by providing students opportunities to make choices about their approach for collecting data, determine appropriate equations to represent the situation, and choose ways to best represent their analysis (MP4).

Lesson 18: [Class Surveys \(optional\)](#) (Activity 1, Activity 2, Activity 3)

- The purpose of this lesson is for students to use what they have learned about data, bar graphs, and tape diagrams to create a survey and to organize, collect, and represent data.
- [Lesson 18 Slides](#)
- [Teacher Presentation Materials](#)

Communicate and Present:

Invite students to share their graphs (Lesson 18 - Activities 1-3).

- “How are these graphs the same? How are they different?” (The bar graph has numbers on it, but the picture graphs don’t. Some have 3 and some have 4 different responses. Some are up and down and some are side-to-side.)
- “What choices did these mathematicians make with their graphs?” (They had to decide what kind of graph to make, a title, which direction to show the bars

Reflection:

“Today we had a chance to learn more about each other by collecting data and representing it in multiple ways.”

Display a student generated bar or picture graph and the tape diagram side by side.

<p>in how to represent their data so it is clear with a title, labels, or pictures.) “Where do we see the equations in their graph? What does the equation mean?” “What’s the difference between answering the questions from a bar graph and answering them from a picture graph?” Display selected student work. “What information does this diagram or equation tell us about our classmates?” “Where do you see this equation in the diagram?”</p>	<p>Consider asking: “How are these representations the same?” (They are from the same survey.) “What information can we see in the picture/bar graph that we don’t see in the diagram?” (All of the people that were surveyed.) “What information can we see in the diagram that we don’t see in the picture/bar graph?” (It’s easier to compare two of the groups in the diagram than in the graph.)</p>
<p>Notes: Follow all lessons in numerical order.</p>	<p>Complete File with Resources and Task:</p>