

Course Title: Mathematics	Full Year	Required
<p><b>Course Description:</b> The mathematical work for Grade 4 is partitioned into 9 units:</p> <ul style="list-style-type: none"> <li>● Understanding Factors and Multiples</li> <li>● Fraction Equivalence and Comparison</li> <li>● Extending Operations to Fractions</li> <li>● From Hundredths to Hundred-thousands</li> <li>● Multiplicative Comparison and Measurement</li> <li>● Multiplying and Dividing Multi-digit Numbers</li> <li>● Angles and Angle Measurement</li> <li>● Properties of Two-dimensional Shapes</li> <li>● Putting it All Together</li> </ul>		
<p><b>Additional Course Information:</b> The big ideas in Grade 4 include:</p> <ul style="list-style-type: none"> <li>● generalizing place value understanding for multi-digit whole numbers.</li> <li>● using place value understanding and properties of operations to perform multi-digit arithmetic and solve problems.</li> <li>● developing understanding and fluency with multi-digit multiplication</li> <li>● developing understanding of dividing to find quotients involving multi-digit dividends</li> <li>● building fractions from unit fractions by applying and extending previous understandings of operations with whole numbers.</li> <li>● developing an understanding of fraction equivalence and ordering, as well as addition and subtraction of fractions with like denominators</li> <li>● multiplication of fractions by whole numbers</li> <li>● understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.</li> <li>● Required fluency: Add and subtract within 1,000,000 (4.NBT.B.4)</li> </ul>	<p><b>Core Resources:</b></p> <p><a href="#">Illustrative Mathematics:</a></p> <p><a href="#">Instructional Routines and Math Language Routines:</a></p> <p><a href="#">Grade 4 Glossary</a></p> <p><a href="#">Grade 4 Unit 5 Glossary</a></p> <p><a href="#">Required Materials Unit 5</a></p> <p><a href="#">IM en Español</a></p> <p><a href="#">Grade 4 en Español</a></p> <p><a href="#">Developing a Mathematical Community</a></p>	<p><b>Are there any attachments <u>at the course level</u> that teachers will need?</b></p> <p><a href="#">Grade 4 Scope and Sequence</a></p> <p><a href="#">Pacing Guide and Dependency Diagrams K-5</a></p>

## Unit 5: Multiplicative Comparison and Measurement

Duration: (19 - 20 Days)

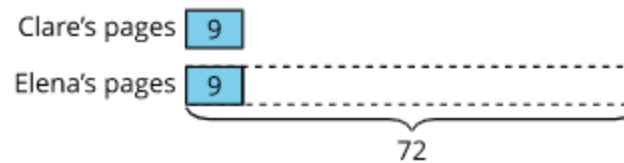
### Unit Overview - FOCUS:

In this unit, students make sense of multiplication as a way to compare quantities. They use this understanding to solve problems about measurement.

In earlier grades, students related two quantities and made additive comparisons, where the key question was “How many more?” Here, they make multiplicative comparisons, in which the underlying question is “How many times as many?” For example, if Mai has 3 cubes and Tyler has 18 cubes, we can say that Tyler has 6 times as many cubes as Mai does.

Initially, students reason using concrete manipulatives and discrete images. Later, they reason more abstractly, using tape diagrams and equations. Comparative language such as “\_\_\_\_\_ times as many (or much) as \_\_\_\_\_” is emphasized, offering students opportunities to attend to precision as they communicate mathematically (MP6).

Write a multiplication equation to compare the pages read by Elena and Clare.  
Use a symbol to represent the unknown.



Next, students use the idea and language of multiplicative relationships to learn about various units of length, mass, capacity, and time, and to convert from larger units to smaller units within the same system of measurement. For example, they describe 1 kilometer as 1,000 times as long as a meter. Students then use their new knowledge to solve measurement problems.

- **Section A: Multiplicative Comparison**
  - Analyze, describe, and represent multiplicative comparison situations.
  - Solve one-step and two-step problems involving multiplicative comparison.
- **Section B: Measurement Conversion**
  - Convert from larger units to smaller units within a given system of measurement.
  - Solve multi-step problems involving multiplicative comparison and measurement.
  - Understand the relative sizes of kilometers, meters and centimeters, liters and milliliters, kilograms and grams, and pounds and ounces.
- **Section C: Let's Put it to Work**
  - Solve multi-step problems involving multiplicative comparison and



*Elena's frisbee went 3 times as far as Clare's did.*

*Andre's frisbee went 4 times as far as Tyler's did.*

*How far did Elena and Tyler throw the frisbee?*

student	distance
Han	17 yards
Lin	$51\frac{1}{2}$ feet
Clare	$21\frac{1}{3}$ feet
Andre	22 yards 2 feet
Elena	
Tyler	

measurement.

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

In prior grade levels, students have worked extensively on adding and subtracting within 1,000. Beginning in second grade, students develop concepts to support adding and subtracting large numbers within 1,000. Unit 3 in third grade continues this work as it focuses once again on addition and subtraction but provides additional opportunities to develop flexibility, accuracy, and fluency. This work continues to develop in fourth grade as students expand their number system to include decimals (up to the hundredths) and up to hundred-thousands.

Unit 5 in fourth grade moves students to engage with multiplicative comparison problems in which students need to have a solid understanding of place value. Within this unit, students make conversions between different units of measurement. Following this unit, students will begin to work on multiplying and dividing multi-digit numbers.

**Essential Questions:**

How does the multiplicative comparison help us to find equivalent measurements?

**Enduring Understanding:**

**We can use our knowledge of the multiplicative comparison to find equivalent measurements and move between different units of measurement.** For instance, we know that for every hour, there is 60 minutes. Therefore, we can utilize the multiplication and division relationship to move

	between hours and seconds. Understanding how measurement units relate to one another allows us to compare more precisely.	
<p><b>What Students Will Know:</b></p> <ul style="list-style-type: none"> <li>● “Times as many” can be an indication for multiplicative comparison situations</li> <li>● There is a difference between <math>n</math> times as many and <math>n</math> more</li> <li>● We can use multiplication and division equations to represent multiplicative comparison situations</li> <li>● A factor in a multiplication equation represents a multiplier</li> <li>● Some diagrams are inefficient in working with larger numbers</li> <li>● Tape diagrams can help us in modeling situations with larger numbers</li> <li>● We can use symbols to represent an unknown in a situation</li> <li>● There is a relationship between multiplication and division</li> <li>● There is a multiplicative comparison relationship between centimeters and meters</li> <li>● 1 meter is 100 times as long as 1 centimeter</li> <li>● We can use 1 meter is 100 times as long as 1 centimeter to convert measurements in meters to centimeters</li> <li>● 1 kilometer is 1,000 times as long as 1 meter</li> <li>● 1 kilogram is 1000 times as heavy as 1</li> </ul>	<p><b>What students will do:</b></p> <ul style="list-style-type: none"> <li>● Represent multiplicative comparison situations using objects and drawings.</li> <li>● Represent situations and descriptions of multiplicative comparison using diagrams and equations.</li> <li>● Interpret and represent multiplicative comparison situations in which a factor is unknown.</li> <li>● Extend understanding of multiplicative comparison situations that involve larger quantities and larger multipliers.</li> <li>● Solve multiplicative comparison word problems with one or two steps.</li> <li>● Represent and solve problems in context involving multiplicative comparison.</li> <li>● Represent and solve multiplicative comparison problems involving multiples of 10.</li> <li>● Make sense of the relative size of meters and centimeters and to express meters in terms of centimeters.</li> <li>● Describe the multiplicative relationship between kilometers and meters and express the former in terms of the latter.</li> <li>● Describe the relationship between liters and milliliters and between kilograms and grams, and to express each of the larger units in terms of the smaller units.</li> <li>● Apply what they learned about metric units of measurement and multiplicative comparison to solve multi-step problems.</li> <li>● Make sense of the relative size of pounds and ounces and to express pounds in terms of ounces.</li> <li>● Use multiplication to describe the relationship between units of time and to express larger units of</li> </ul>	<p><b>Unit Specific Vocabulary:</b></p> <p>Common Denominator  Composite Number  Denominator  Equivalent Fractions  Factor Pair of a Whole Number  Mixed Number  Multiple of a Number  Numerator  Prime Number  Rounding</p> <p><b>Academic vocabulary</b></p> <p>Times as Many  Tape Diagrams  Unit Conversion  Meters  Centimeter  Kilometer  Liters  Milliliters  Kilograms  Grams  Pounds  Ounces  Capacity  Perimeter</p>

<p>gram</p> <ul style="list-style-type: none"> <li>● 1 liter is 1,000 times as much as 1 milliliter</li> <li>● Pounds are larger than ounces</li> <li>● 1 pound is 16 times heavier than 1 ounce</li> <li>● There is a multiplicative relationship between hours and minutes and between minutes and seconds</li> <li>● Hours, minutes, and seconds are all related</li> <li>● We can use our knowledge of unit conversions and multiplicative reasoning to solve multi-step problems</li> <li>● There is a relationship between side lengths and the perimeter of a rectangle</li> <li>● Knowing different units of measurement allows us to compare facts about the world around us (example: comparing facts about animals)</li> </ul>	<p>time in terms of smaller ones.</p> <ul style="list-style-type: none"> <li>● Solve multi-step problems that involve multiplicative comparison and measurement in whole numbers and fractions.</li> <li>● Apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about weight and capacity.</li> <li>● Apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about distances and lengths.</li> <li>● Apply multiplicative reasoning and their knowledge of fractions to solve problems about perimeters of rectangles.</li> <li>● Solve geometric problems using their understanding of length measurements, unit conversion, multiplicative comparison, and addition or subtraction of fractions.</li> <li>● Apply their understanding of multiplication and measurement conversion to compare facts.</li> </ul>	
<p><b>Entry Level Assessment and Connection to Unit:</b></p> <p><a href="#">Grade 4 Unit 5 Entry Level Task</a></p> <p><b>Task:</b> Provide each student with the pre-unit assessment document. These questions should be completed independently by students in order to understand what prerequisite concepts and skills students have mastered and which</p>	<p><b>Unit Materials, Resources and Technology:</b></p> <ul style="list-style-type: none"> <li>● <a href="#">Illustrative Mathematics:</a></li> <li>● <a href="#">Instructional Routines and Math Language Routines:</a></li> <li>● <a href="#">Grade 4 Glossary</a></li> <li>● <a href="#">Required Materials</a></li> <li>● <a href="#">IM en Español</a></li> <li>● <a href="#">Pacing Guide and Dependency Diagrams K-5</a></li> </ul>	

<p>concepts and skills students need additional support with.</p> <p><b>Purpose:</b> These problems address prerequisite concepts and skills for the unit. Teachers can use these problems to identify unfinished learning that can be carefully addressed during the unit.</p>	
<p><b>Opportunities for Interdisciplinary Connections:</b></p> <p>Science can be a wonderful opportunity in which students can utilize their understanding of conversions in a different setting. Through experiments, students can conceptually see the difference between some of these units of measurement. For instance, students can experiment with a graduated cylinder to be able to see the differences between liters.</p> <p>As students engage in various experiments, an easy connection to math could be to have students convert between the different units of measurement. For instance, if students are measuring time, they could determine how many minutes or seconds the event is.</p>	
<p><b>Any links, attachments and resources:</b></p> <p><a href="#">Instructional Routines Document</a></p> <p><a href="#">Family Support Materials Unit 5</a></p>	<p><b>Planning Ideas:</b></p> <p><a href="#">Components of a Typical IM Lesson</a></p> <p><a href="#">What To Know About IM When Planning</a></p> <p><a href="#">Gr 4 Where to Find the Mathematical Practices in the Units</a></p> <p><a href="#">Assessing the Mathematical Practices</a></p>

<b>Topic # 1 (Section A)</b>	<b>Topic Name: Section A: Multiplicative Comparison</b>	<b>Duration:</b> Recommended: 6-7 days (6 lessons)
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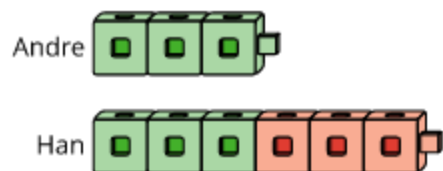
**Topic Description:**

Section A Learning Goals

- Analyze, describe, and represent multiplicative comparison situations.
- Solve one-step and two-step problems involving multiplicative comparisons.


In this section, students learn to compare two quantities in terms of multiplication and to solve multiplicative comparison problems.

In earlier grades, students made comparisons in terms of addition or subtraction. To describe the number of cubes in the image, they may say, “Han has 3 more cubes than Andre,” or “Andre has 3 fewer cubes than Han.” Here, they make this comparison by saying “Han has 2 times (or twice) as many cubes as Andre.”




Students begin with comparisons that involve small factors and familiar situations (such as comparing blocks), using familiar multiplicative comparison language (such as “twice,” or “twice as many”). They progress from using concrete representations (actual cubes) to discrete diagrams (showing cubes, or showing sections that each represent single objects). As they encounter larger factors and more-abstract situations, students interpret and use diagrams where each section represents any quantity.

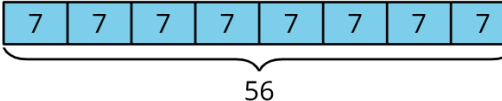
*Diego has 5 times as many cubes as Kiran.*

Kiran's cubes 

Diego's cubes 

Diego read 8 times as many books as Lin. Lin read 7 books. How many books did Diego read?

Lin's pages 

Diego's pages 

Students write multiplication equations to express comparisons. As the problems become more complex, they reason with given diagrams (or diagrams they draw) and use division to find a missing factor.

Jada read some pages. Han read 60 pages altogether. The diagram shows how their pages compare.

How many times as many as Jada's pages did Han read?

Jada's pages 

Han's pages 

**Competencies Addressed:**

**Understanding and Applying Number Systems**

**4.NS.4.** I can use strategies to multiply and divide whole numbers. (4.NBT.B5)

**Operations and Algebraic Thinking**

**4.OA.2** I can use the four operations to solve multi-step problems. (4.OA.A.1, 4.OA.A.2, 4.OA.A.3)

**Essential Question and Enduring Understanding Addressed in this Topic:**

**Essential Question**

How does the multiplicative comparison help us to find equivalent measurements?

**Enduring Understanding**

**We can use our knowledge of the multiplicative comparison to find equivalent**

	<p><b>measurements and move between different units of measurement.</b> For instance, we know that for every hour, there is 60 minutes. Therefore, we can utilize the multiplication and division relationship to move between hours and seconds. Understanding how measurement units relate to one another allows us to compare more precisely.</p>
<p><b>In Topic A, students will know:</b></p> <ul style="list-style-type: none"> <li>● “Times as many” can be an indication for multiplicative comparison situations</li> <li>● There is a difference between <math>n</math> times as many and <math>n</math> more</li> <li>● We can use multiplication and division equations to represent multiplicative comparison situations</li> <li>● A factor in a multiplication equation represents a multiplier</li> <li>● Some diagrams are inefficient in working with larger numbers</li> <li>● Tape diagrams can help us in modeling situations with larger numbers</li> <li>● We can use symbols to represent an unknown in a situation</li> <li>● There is a relationship between multiplication and division</li> </ul>	<p><b>Topic Vocabulary:</b></p> <p><b>Academic vocabulary</b>  Times as Many  Tape Diagrams  Measurement Conversion</p>
<p><b>In Topic A, students will be able to:</b></p> <ul style="list-style-type: none"> <li>● Represent multiplicative comparison situations using objects and drawings.</li> <li>● Represent situations and descriptions of multiplicative comparisons using diagrams and equations.</li> <li>● Interpret and represent multiplicative comparison situations in which a factor is unknown.</li> <li>● Extend understanding of multiplicative comparison situations that involve larger quantities and larger multipliers.</li> <li>● Solve multiplicative comparison word problems with one or two steps.</li> <li>● Represent and solve problems in context involving multiplicative comparisons.</li> </ul>	<p><b>Plan for Student Reflection:</b></p> <p><a href="#">Student Journal Prompts and Reflection Practices</a></p> <hr/> <p><b>Teacher Journal Reflection Questions:</b></p> <p><b>Lesson 1:</b> How did students use the cubes to reason about or explain multiplicative comparison?</p> <p><b>Lesson 2:</b> How were students able to connect</p>

physical representations of times as many to those on paper and equations?

**Lesson 3:** Which representations best supported student learning in today's lesson?

**Lesson 4:** How did the structure of the tape diagram support students in identifying what was unknown?

**Lesson 5:** What idea were students grappling with most in this lesson?

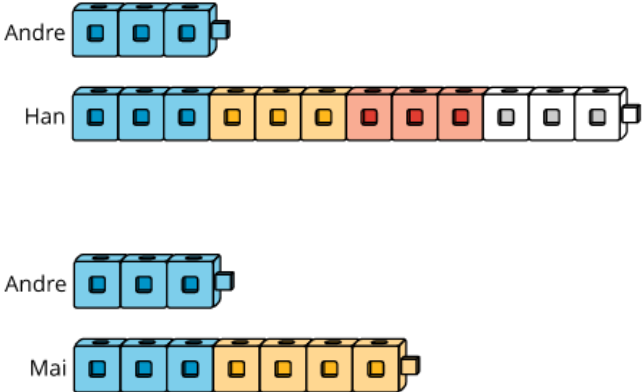
**Lesson 6:** What vocabulary did you hear students using as they begin to understand multiplication of multi-digit numbers?

**Utilize additional strategies for Teacher Reflection:**

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

## Topic 1 (Section A) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

<b>Task Title: Topic 1- Multiplicative Comparison</b>	<b>Grade Level and Unit: Fourth Grade, Unit 5</b>
<b>Description of Task:</b> In this activity, students analyze situations in which one quantity is ten times as much as another quantity. Students may use different strategies to determine the missing quantity. For example, they may rely on counting as a strategy, or use place value understanding to explain regularity in the products of numbers with 10 (MP8).	<b>Purpose of Task:</b> The reasoning in this lesson prepares students to consider quantities that are 100 times and 1,000 times as many in the next section.
<b>Background of Students/Learning Progression:</b> In previous grades, students learned how to represent additive comparison situations using discrete diagrams, tape diagrams, and addition and subtraction equations that use symbols to represent an unknown quantity. They used these representations to find differences.	<b>Ensure all competencies are addressed in the task:</b> <input type="checkbox"/> Yes, all competencies are addressed <input type="checkbox"/> No - Task needs modification
<b>Getting Started:</b> Display the following image:  	

Ask students “What do you notice? What do you wonder?” Provide one minute of independent think time. After, have students discuss their thinking with a partner for one minute. Have students share with the class. As they are sharing, record their responses.

## Learning Cycle Model

### Section A

IM Lesson	<a href="#">L1: Times as Many</a>	<a href="#">L2: Interpret Representations of Multiplicative Comparison</a>	<a href="#">L3: Solve Multiplicative Comparison Problems</a>	<a href="#">L4: Solve Multiplicative Comparison Problems with Large Numbers</a>	<a href="#">L5: One- and Two-step Comparison Problems</a>	<a href="#">L6: Ten Times as Many</a>
Learning Cycle Model	Making Meaning	Making Meaning	Investigate	Investigate	Investigate	Create and Produce
Naugatuck Math Competency	4.OA.2	4.OA.2	4.OA.2	4.OA.2	4.OA.2	4.NS.4, 4.OA.2
Math Practice Standards		MP2	MP2	MP2	MP2	MP6
Lesson Purpose	The purpose of this lesson is for students to interpret and represent multiplicative comparison situations using objects and diagrams.	The purpose of this lesson is for students to represent situations and descriptions of multiplicative comparison using diagrams and equations.	The purpose of this lesson is for students to interpret and represent multiplicative comparison situations in which a factor is unknown.	The purpose of this lesson is for students to extend their understanding of multiplicative comparison to situations that involve larger quantities and larger multipliers.	The purpose of this lesson is for students to solve multiplicative comparison word problems with one or two steps.	The purpose of this lesson is for students to represent and solve multiplicative comparison problems involving multiples of 10.
Vocabulary Focus	Times as many, twice, twice as many, more than	Multiplicative comparison, $n$ times as many,	Factor, multiplier, discrete diagrams			Patterns of multiples
Lesson Materials/ Resources	<a href="#">Lesson 1 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a> <b>Activities 1 &amp; 2:</b>	<a href="#">Lesson 2 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a> <b>Activity 1:</b>	<a href="#">Lesson 3 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a> <b>Activities 1 and 2:</b>	<a href="#">Lesson 4 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a>	<a href="#">Lesson 5 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a>	<a href="#">Lesson 6 Slides</a> <a href="#">Teacher Presentation Materials</a> <a href="#">Student Pages</a>

	<ul style="list-style-type: none"> <li>Students need access to connecting cubes</li> </ul> <p><b>Activity 3</b> (optional)</p> <ul style="list-style-type: none"> <li>Each group of 2 need 40 connecting cubes and one Number cubes (numbered die), and a copy of <a href="#">Times as Many Recording Mat</a></li> </ul> <p><a href="#">Cool-Down Three Times as Many Cubes</a></p>	<ul style="list-style-type: none"> <li>Students need access to connecting cubes</li> </ul> <p><a href="#">Lesson 2 Cool-Down Comparing Cubes</a></p>	<ul style="list-style-type: none"> <li>Students need access to connecting cubes</li> </ul> <p><a href="#">Lesson 3 Cool-Down Back at the Book Drive</a></p>	<p>No additional materials needed</p> <p><a href="#">Lesson 4 Cool-Down Represent Multiplicative Comparison</a></p>	<p>No additional materials needed</p> <p><a href="#">Lesson 5 Cool-Down Comics and Posters</a></p>	<p>No additional materials needed</p> <p><a href="#">Lesson 6 Cool Downs What's the Value</a></p>
<b>Assessment</b>	<p><b>Formative Assessment Strategies: observation, questioning, student discourse : <a href="#">Monitoring Sheet</a></b>  See <a href="#">Section A Checkpoint Assessment</a>, <a href="#">Section A Checkpoint Teacher's Guide</a></p>					
						<a href="#">Section A Practice Problems</a>
<b>Centers</b>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">How Close? (1–5)</a>, Stage 5: Multiply to 100 Supporting</p> <p><a href="#">Five in a Row: Multiplication (3–5)</a>, Stage 2: Factors 1–9 Supporting</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">How Close? (1–5)</a>, Stage 5: Multiply to 100 Supporting</p> <p><a href="#">Five in a Row: Multiplication (3–5)</a>, Stage 2: Factors 1–9 Supporting</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Five in a Row: Multiplication (3–5)</a>, Stage 2: Factors 1–9 Supporting</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Five in a Row: Multiplication (3–5)</a>, Stage 2: Factors 1–9 Supporting</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Five in a Row: Multiplication (3–5)</a>, Stage 2: Factors 1–9 Supporting</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>
<p><b>Making Meaning:</b>  In Lesson 1, students interpret the language of “times as many” in multiplicative comparison situations and connect this language to representations. They learn to recognize the difference between <math>n</math> times as many and <math>n</math> more. As they create representations using discrete diagrams in which each piece represents one item, students have opportunities to examine any errors in the representations they create and</p>						

make necessary revisions. Although students may write equations to represent multiplicative comparisons, it is not required here, as they will have an opportunity to explore equations in depth in future lessons.

In Lesson 2, students analyze and interpret images of discrete objects (connecting cubes) and discrete tape diagrams in which each unit is visible. These diagrams are precursors for more abstract tape diagrams that are used in future lessons.

Students also make connections between the multiplicative comparison language and multiplication equations. For example, they interpret “15 is 3 times as many as 5” as  $15 = 3 \times 5$  or  $15 = 5 \times 3$ .

In this unit, the convention of representing the multiplier as the first factor in equations is used. Students may write the factors in any order. In later lessons, students write division equations to represent multiplicative comparisons using their understanding of the relationship between multiplication and division.

Lesson 2 gives students an opportunity to make sense of each equation and how it relates to a corresponding image or diagram (MP2).

### [Lesson 1: Times as Many](#)

- The purpose of this lesson is for students to interpret and represent multiplicative comparison situations using objects and diagrams.
- [Teacher Presentation Materials](#)
- [Lesson 1 Slides](#)

### [Lesson 2: Interpret Representations of Multiplicative Comparison](#)

- The purpose of this lesson is for students to represent situations and descriptions of multiplicative comparison using diagrams and equations.
- [Teacher Presentation Materials](#)
- [Lesson 2 Slides](#)

### **Investigation:**

In Lesson 3, students write multiplication and division equations, draw diagrams, and use their understanding of the relationship between multiplication and division.

In Lesson 4, students extend their understanding of multiplicative comparison, including ways to represent it, to include comparisons with larger amounts and multipliers.

In the warm-up, students notice that the discrete diagrams used in previous lessons become inefficient with larger numbers. Later, they interpret tape diagrams in which each section is labeled with a number to represent a quantity, rather than to represent one object. Students use these diagrams to determine the amounts being compared and the factor that relates the amounts.

In Lesson 5, students apply what they learned about interpreting and representing multiplicative comparison situations to problems in context. The numbers students encounter here are larger, encouraging them to transition from discrete diagrams to more-abstract tape diagrams in which each section is labeled to represent a quantity (MP2).

Students continue to write equations with symbols representing the unknown and to describe the meaning of their equations in the context of the word problems. In both activities, they extend their understanding of multiplicative comparison and tape diagrams to solve a two-step problem.

### [Lesson 3: Solve Multiplicative Comparison Problems](#)

- The purpose of this lesson is for students to interpret and represent multiplicative comparison situations in which a factor is unknown.
- [Teacher Presentation Materials](#)
- [Lesson 3 Slides](#)

### [Lesson 4: Solve Multiplicative Comparison Problems with Large Numbers](#)

- The purpose of this lesson is for students to extend their understanding of multiplicative comparison to situations that involve larger quantities and larger multipliers.
- [Teacher Presentation Materials](#)
- [Lesson 4 Slides](#)

### [Lesson 5: One- and Two-step Comparison Problems](#)

- The purpose of this lesson is for students to solve multiplicative comparison word problems with one or two steps.
- [Teacher Presentation Materials](#)
- [Lesson 5 Slides](#)

**Create and Produce:**

In this lesson, students apply place value understanding, where they look for and make use of structure, to what they have learned about representing and solving multiplicative comparison problems (MP7). They use tape diagrams and equations to represent multiplicative comparisons that are “10 times as many.”

Students will build on this understanding in the next section as they convert measurements from larger metric units into smaller ones (for instance, from meters to centimeters, kilograms to grams, or liters to milliliters).

### [Lesson 6: Ten Times as Many](#)

- The purpose of this lesson is for students to represent and solve multiplicative comparison problems involving multiples of 10.
- [Teacher Presentation Materials](#)
- [Lesson 6 Slides](#)

#### **Communicate and Present:**

- “What were some things you noticed about the values of A and B?” (Sample responses:
  - A was less and B was always greater. “How many times as much as A was B?” (Ten times)
  - The digits of A are all in B and are in the same order, but they are not in the same places in B. There's an extra 0 at the end of the value for B. “Why do you think this is?” (Because they are multiplying 10 by A.)
  - “Could we represent both  $4 \times 10$  and  $10 \times 10$  using the same diagram of A and B? Why or why not?” (Yes, because A could represent 4 or 10, and B represents 10 times that value.)

#### **Reflection:**

“Today we used diagrams to represent values that are ten times as much as different values. We noticed some patterns when we analyzed the values.”

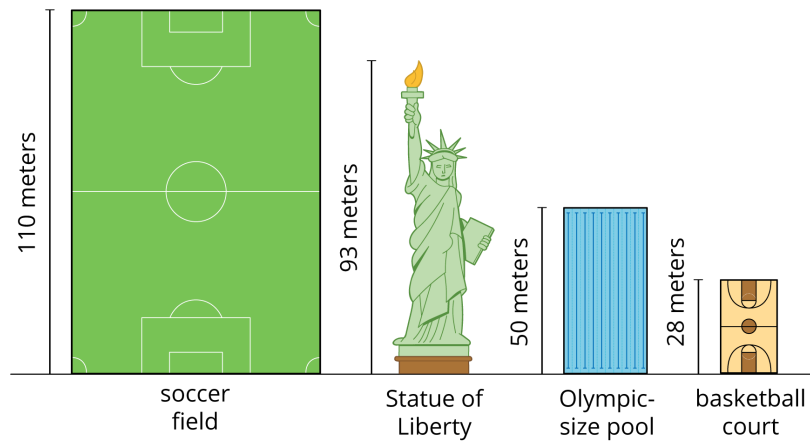
Display:



“What are some other statements we can make about this diagram that would always be true?” (The value of B is always ten times the value of A. If you know the value of A you can always figure out the value of B using multiplication. If you know the value of B you can always figure out the value of A.)

	Focus discussion on how the diagram shows that the value of A is ten times as much as the value of B no matter what the value of each rectangle is.
<b>Notes:</b>	<b>Complete File with Resources and Task:</b> Task-Based Learning Plan Format for Topic 1

<b>Topic # 2 (Section B)</b>	<b>Topic Name: Section B - Measurement Conversion</b>	<b>Duration:</b> Recommended: 7-8 days (7 lessons)
<p><b>Topic Description:</b></p> <p>Section B Learning Goals</p> <ul style="list-style-type: none"> <li>● Convert from larger units to smaller units within a given system of measurement.</li> <li>● Solve multi-step problems involving multiplicative comparison and measurement.</li> <li>● Understand the relative sizes of kilometers, meters and centimeters, liters and milliliters, kilograms and grams, and pounds and ounces.</li> </ul> <p>Students have encountered units of measurement in earlier grades and in their daily lives. They have measured and estimated lengths in centimeters and meters, recognized the number of minutes in an hour and measured intervals of time, and solved problems involving capacity and mass.</p> <p>In this section, students expand on these concepts to convert measurements within the same system (metric or customary) from larger units to smaller units. These conversions require an understanding of the multiplicative relationship between units.</p> <p>Students begin by exploring lengths in metric units. To develop a sense of the multiplicative relationship between centimeters and meters, students build a length of 1 meter from centimeter grid paper. They recognize that 1 meter is 100 times as long as 1 centimeter and use this reasoning to convert meters to centimeters. Later, they make sense of 1 kilometer by relating it to multiples of shorter measurements, such as the length of a basketball court or a soccer field.</p>		



Later, students learn the relationships between grams and kilograms, milliliters and liters, ounces and pounds, and hours, minutes, and seconds. As they solve problems and use multiplication to perform conversion, they develop a sense of the relative size of the units.

*Put the animals and their travel distances in order, from the shortest to the longest.*

animal	distance traveled in a day
three-toed sloth	30 meters
snail	2,500 centimeters
dromedary	40 kilometers
giant tortoise	500 meters

<p><b>Competencies Addressed:</b></p> <p><b>Measurement and Data Investigations</b>  <b>4.MD.1</b> I can solve problems involving measurement (time, money, customary and metric, are, perimeter, and conversion of measurements). <b>4.MD.A.1,2</b></p> <p><b>Operations and Algebraic Thinking</b>  <b>4.OA.2</b> I can use the four operations to solve multi-step problems. <b>4.OA.A.2, 4.OA.A.3</b></p>	<p><b>Essential Question and Enduring Understanding Addressed in this Topic:</b></p> <p><b>Essential Question</b>  How does the multiplicative comparison help us to find equivalent measurements?</p> <p><b>Enduring Understanding</b>  <b>We can use our knowledge of the multiplicative comparison to find equivalent measurements and move between different units of measurement.</b> For instance, we know that for every hour, there is 60 minutes. Therefore, we can utilize the multiplication and division relationship to move between hours and seconds. Understanding how measurement units relate to one another allows us to compare more precisely.</p>
<p><b>In Topic B, students will know:</b></p> <ul style="list-style-type: none"> <li>● There is a multiplicative comparison relationship between centimeters and meters</li> <li>● 1 meter is 100 times as long as 1 centimeter</li> <li>● We can use 1 meter is 100 times as long as 1 centimeter to convert measurements in meters to centimeters</li> <li>● 1 kilometer is 1,000 times as long as 1 meter</li> <li>● 1 kilogram is 1000 times as heavy as 1 gram</li> <li>● 1 liter is 1,000 times as much as 1 milliliter</li> <li>● Pounds are larger than ounces</li> <li>● 1 pound is 16 times heavier than 1 ounce</li> <li>● There is a multiplicative relationship between hours and minutes and between minutes and seconds</li> <li>● Hours, minutes, and seconds are all related</li> </ul>	<p><b>Topic Vocabulary:</b></p> <p><b>Academic vocabulary</b>  Meters  Centimeter  Kilometer  Liters  Milliliters  Kilograms  Grams  Pounds  Ounces  Capacity</p>

**In Topic B, students will be able to:**

- Make sense of the relative size of meters and centimeters and to express meters in terms of centimeters.
- Describe the multiplicative relationship between kilometers and meters and express the former in terms of the latter.
- Describe the relationship between liters and milliliters and between kilograms and grams, and to express each of the larger units in terms of the smaller units.
- Apply what they learned about metric units of measurement and multiplicative comparison to solve multi-step problems.
- Make sense of the relative size of pounds and ounces and to express pounds in terms of ounces.
- Use multiplication to describe the relationship between units of time and to express larger units of time in terms of smaller ones.
- Solve multi-step problems that involve multiplicative comparison and measurement in whole numbers and fractions.

**Plan for Student Reflection:**

[Student Journal Prompts and Reflection Practices](#)

**Plan for Teacher Reflection:**

**Teacher Journal Reflection Questions**

**Lesson 7:** What evidence do you have that students are thinking conceptually about “100 times as many” and not simply adding zeros to the end of a number without reasoning?

**Lesson 8:** What part of the lesson went really well in terms of helping students reason about the size of 1 kilometer and its relationship to 1 meter?

**Lesson 9:** How can you incorporate opportunities to measure weight and capacity in science or other subject areas?

**Lesson 10:** In what ways did your students show they had depth of understanding beyond what you expected in this lesson? Why?

**Lesson 11:** In what ways did you see their current knowledge of multiplicative comparison help or hinder them in performing unit conversions?

**Lesson 12:** How did previewing the cool-down

ahead of time help you synthesize the learning that took place in the lesson?


**Lesson 13:** As students shared their ideas today, how did you ensure all students' voices were heard and valued as an important part of the collective learning?

**Utilize additional strategies for Teacher Reflection:**

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

## Topic 2 (Section B) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

<b>Task Title: Topic 2 - Measurement Conversion</b>	<b>Grade Level and Unit: Fourth Grade, Unit 5</b>
<b>Description of Task:</b> This optional activity invites students to apply their knowledge of pounds and ounces and multiplicative reasoning to solve a puzzle about the quantities of ingredients on a shopping list. To solve the puzzle, students need to express pounds as ounces and reason deductively.	<b>Purpose of Task:</b> As they work to eliminate possibilities, draw conclusions, and explain their thinking to others, students practice constructing logical arguments (MP3).
<b>Background of Students/Learning Progression:</b> In earlier grades, students measured and estimated lengths in centimeters and meters to develop a sense of each. They learned that there are 100 centimeters in 1 meter.	<b>Ensure all competencies are addressed in the task:</b> <input type="checkbox"/> Yes, all competencies are addressed <input type="checkbox"/> No - Task needs modification
<b>Getting Started:</b> Display the following image: 	

Tell students “Find some of these objects, or ones like them, around you. How long are some of your pencils? How long are the scissors at home?” Allow for students to explore items in the classroom and measure them utilizing a ruler. If time permits, allow students to continue their exploration at home and discuss the following day.

**Section B**

IM Lesson	<a href="#">L7: Meters and Centimeters</a>	<a href="#">L8: Meters and Kilometers</a>	<a href="#">L9: Grams and Kilograms, Liters and Milliliters</a>	<a href="#">L10: Multi-step Measurement Problems</a>	<a href="#">L11: Pounds and Ounces</a>	<a href="#">L12: Hours, Minutes, and Seconds</a>	<a href="#">L13: Multi-step Measurement Problems with Fractions</a>
<b>Learning Cycle Model</b>	Making Meaning	Making Meaning	Making Meaning	Investigation	Investigation	Investigation	Create and Produce
<b>Naugatuck Math Competency</b>	4.MD.1	4.MD.1	4.MD.A1	4.MD.2, 4.OA.2	4.MD.1, 4.OA.2	4.MD.1, 4.OA.2	4.MD.1, 4.OA.2
<b>Math Practice Standards</b>	MP3			MP2			MP7, MP1, MP3
<b>Lesson Purpose</b>	The purpose of this lesson is for students to make sense of the relative size of meters and centimeters and to express meters in terms of centimeters.	The purpose of this lesson is for students to describe the multiplicative relationship between kilometers and meters and express the former in terms of the latter.	The purpose of this lesson is for students to describe the relationship between liters and milliliters and between kilograms and grams, and to express each of the larger units in terms of the smaller units.	The purpose of this lesson is for students to apply what they learned about metric units of measurement and multiplicative comparison to solve multi-step problems.	The purpose of this lesson is for students to make sense of the relative size of pounds and ounces and to express pounds in terms of ounces.	The purpose of this lesson is for students to use multiplication to describe the relationship between units of time and to express larger units of time in terms of smaller ones.	The purpose of this lesson is for students to solve multi-step problems that involve multiplicative comparison and measurement in whole numbers and fractions.
<b>Vocabulary Focus</b>	Length, centimeters, meters, relationship	kilometers	Liters, milliliters, kilogram, gram		Pound, ounces	Conversion	Pounds, ounces, hours, minutes
<b>Lesson Materials/ Resources</b>	<a href="#">Lesson 7 Slides</a>	<a href="#">Lesson 8 Slides</a>	<a href="#">Lesson 9 Slides</a>	<a href="#">Lesson 10 Slides</a>	<a href="#">Lesson 11 Slides</a>	<a href="#">Lesson 12 Slides</a>	<a href="#">Lesson 13 Slides</a>

	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each student needs centimeter grid paper, scissors, and some tape</li> </ul>	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each student needs scissors</li> <li>Each group needs one set of <a href="#">How Long is One Kilometer?</a></li> </ul>	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Multiple boxes of paper clips for group work</li> </ul> <b>Activity 2:</b> <ul style="list-style-type: none"> <li>If possible, gather a 1-milliliter dropper, a 20-milliliter medicine dosage cup, a 100-milliliter measuring cup or cylinder, and an empty 1-liter bottle with a line at the 1-liter mark or other containers of different sizes,</li> </ul>	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  No additional materials needed	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each group needs a set of <a href="#">Pounds and Ounces</a></li> </ul>	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  No additional materials needed	<a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each group of 2 needs a set of <a href="#">Info Gap: Noah's School Day (Part 2)</a></li> </ul>
	<a href="#">Lesson 7 Cool-Down The Longest Creatures</a>	<a href="#">Lesson 8 Cool-Down How Far Away from School?</a>	<a href="#">Lesson 9 Cool-Down A Chef and a Host</a>	<a href="#">Lesson 10 Cool-Down Hydration Here and There</a>	<a href="#">Lesson 11 Cool-Down Hungry Birds</a>	<a href="#">Lesson 12 Cool Downs Time on Chores</a>	<a href="#">Lesson 13 Cool Downs Oatmeal Raisin Cookies</a>
Assessment	<b>Formative Assessment Strategies: observation, questioning, student discourse : <a href="#">Monitoring Sheet</a></b> See also <a href="#">Section B Checkpoint Assessment</a> , <a href="#">Section B Checkpoint Teacher's Guide</a>						
							<a href="#">Section B Practice Problems</a>

<p style="text-align: center;"><b>Centers Materials</b></p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">Would You Rather? (2–5)</a>, Stage 2: Compare to Smaller Units Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">Would You Rather? (2–5)</a>, Stage 2: Compare to Smaller Units Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">Would You Rather? (2–5)</a>, Stage 2: Compare to Smaller Units Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>	<p><a href="#">How Close? (1–5)</a>, Stage 6: Multiply to 3,000 Addressing</p> <p><a href="#">Compare (1–5)</a>, Stage 3: Multiply within 100 (Supporting)</p>
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### Making Meaning

Lesson 7 helps students see the relationship between centimeters and meters in terms of multiplicative comparison (MP7). Building on their work in previous lessons, students recognize 1 meter as being 100 times as long as 1 centimeter. They use this understanding to convert measurements in meters into centimeters.

Previously, students learned that 1 meter is 100 times as long as 1 centimeter. They converted measurements in meters to centimeters. In Lesson 8, they extend their understanding of metric units of length to include kilometers.

Students develop a sense for 1,000 meters by reasoning multiplicatively about shorter measurements in meters. For example, they see that 1,000 meters is 20 times the length of a 50-meter pool, 10 times the length of a 100-meter track, and so on. In doing so, students develop an awareness of 1 kilometer as 1,000 times as long as 1 meter.

Students use tables and what they know about multiples of 1,000 to support their reasoning as they multiply whole numbers by 1,000 to convert kilometers to meters (MP7).

In Lesson 9, students develop an understanding of 1 kilogram as 1,000 times as heavy as 1 gram, and 1 liter as 1,000 times as much as 1 milliliter. For some students, this may be their first experience with metric units of mass and capacity. The lesson moves quickly to introduce two different sets of measurement units, but students will work with them again in future lessons. Consider offering anchor charts or visual representations to serve as a reference and to solidify the relationships between measurement units.

### [Lesson 7: Meters and Centimeters](#)

- The purpose of this lesson is for students to make sense of the relative size of meters and centimeters and to express meters in terms of centimeters.
- [Teacher Presentation Materials](#)
- [Lesson 7 Slides](#)

### [Lesson 8: Meters and Kilometers](#)

- The purpose of this lesson is for students to describe the multiplicative relationship between kilometers and meters and express the former in terms of the latter.
- [Teacher Presentation Materials](#)
- [Lesson 8 Slides](#)

### [Lesson 9: Grams and Kilograms, Liters and Milliliters](#)

- The purpose of this lesson is for students to describe the relationship between liters and milliliters and between kilograms and grams, and to express each of the larger units in terms of the smaller units.
- [Teacher Presentation Materials](#)
- [Lesson 9 Slides](#)

### **Investigation:**

In the preceding lessons, students learned about the relationship between centimeters and meters, grams and kilograms, and liters and milliliters. In Lesson 10, students integrate what they learned to solve problems that are less straightforward and require them to reason in multiple steps.

Lesson 11 helps students develop a sense of 1 pound as 16 times as heavy as 1 ounce and to use this insight to convert pounds to ounces.

In grade 2, students learned to tell time to the nearest five minutes and recognized that there are 60 minutes in 1 hour. In grade 3, they learned to tell time to the nearest minute and to measure intervals of time. Students may also know that there are 60 seconds in a minute. In Lesson 12, students see the relationship between hours and minutes and between minutes and seconds in multiplicative terms. They then use their new insights to convert hours into minutes and minutes into seconds.

### [Lesson 10: Multi-step Measurement Problems](#)

- The purpose of this lesson is for students to apply what they learned about metric units of measurement and multiplicative comparison to solve multi-step problems.
- [Teacher Presentation Materials](#)
- [Lesson 10 Slides](#)

### [Lesson 11: Pounds and Ounces](#)

- The purpose of this lesson is for students to make sense of the relative size of pounds and ounces and to express pounds in terms of ounces.
- [Teacher Presentation Materials](#)
- [Lesson 11 Slides](#)

### [Lesson 12: Hours, Minutes, and Seconds](#)

- The purpose of this lesson is for students to use multiplication to describe the relationship between units of time and to express larger units of time in terms of smaller ones.
- [Teacher Presentation Materials](#)
- [Lesson 12 Slides](#)

### **Create and Produce:**

In earlier lessons, students learned about the relationship between pounds and ounces and solidified their understanding of how hours, minutes, and seconds are related. In this lesson, they apply these insights to solve multi-step problems, including multiplicative comparison problems. The last activity in the lesson is optional and is a complex puzzle involving pounds and ounces.

### [Lesson 13: Multi-step Measurement Problems with Fractions](#)

- The purpose of this lesson is for students to solve multi-step problems that involve multiplicative comparison and measurement in whole numbers and fractions.
- [Teacher Presentation Materials](#)
- [Lesson 13 Slides](#)

### **Communicate and Present:**

### **Reflection:**

<ul style="list-style-type: none"> <li>● Discuss the order in which students completed the missing values. Ask questions such as: <ul style="list-style-type: none"> <li>● “Which was the first ingredient whose amount you figured out? Was there a reason you started with that item?” (Rice noodles, because it is lightest and <math>\frac{1}{2}</math> pound is very light.)</li> <li>● “Which ingredient and amount did you figure out next?” (Brown rice, because it is 20 times the weight of rice noodles.)</li> <li>● “Was there a point at which you saw multiple possibilities? How did you decide what to do?” (Any of the items could have been <math>\frac{1}{2}</math> pound, but if the heaviest amount was <math>\frac{1}{2}</math> pound, the other ingredients would be very small and not make much sense.)</li> <li>● “How did you find the weight of the heaviest item? How did you know which one it was?” (I found <math>20 \times \frac{1}{2}</math>.)</li> </ul> </li> </ul>	<p>“Today we solved measurement problems in which not all of the necessary information was provided.”</p> <p>“How was that experience different from other problem-solving experiences you had so far?” (We had to think about what information was needed, and also about how to ask questions that would give what we needed.)</p> <p>“What did you find interesting? What did you find challenging?” (We had to explain why we asked for certain pieces of information, which wasn’t always easy.)</p>
<p><b>Notes: Follow IM lessons in numerical order.</b></p>	<p><b>Complete File with Resources and Task:</b></p> <p>Task-Based Learning Plan for Topic 2</p>

**Topic Description:**

## Section C Learning Goals

- Solve multi-step problems involving multiplicative comparison and measurement.

In this section, students use multiplicative comparison and measurement conversion strategies to solve multi-step problems. As they convert customary and metric units of length, mass, and capacity, they continue to develop their understanding of relative sizes of units within the same system.

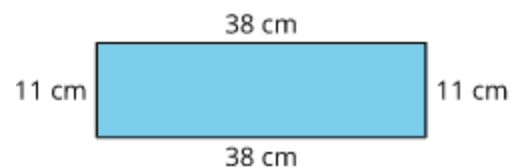
The problems here involve measurement units introduced in the previous section (pounds, ounces, kilometers, meters, centimeters), some from previous grades (yards, feet, and inches), as well as some new ones (gallons, quarts, and cups). As they make sense of situations, create representations, and write equations to solve problems, students practice reasoning quantitatively and abstractly (MP2).

Students also explore multiplicative relationships in geometric contexts. They analyze the relationship between the side lengths and perimeters of quadrilaterals, performing unit conversion along the way.

*Find the perimeter of figure C and the missing side length of figure D.*

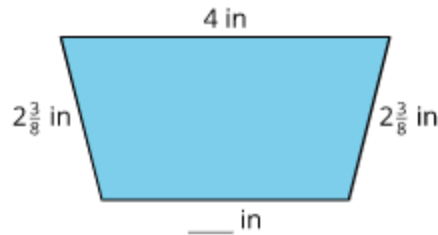
*The perimeter of C is how many times the perimeter of D?*

C



Perimeter = \_\_\_\_\_

D



Perimeter = 12 in

The section ends with an optional lesson in which students apply the understandings from this unit to make sense of measurements related to animals and analyze statements about the

**Competencies Addressed:**

**Measurement and Data Investigations**

**4.MD.1** I can solve problems involving measurement (time, money, customary and metric, are, perimeter, and conversion of measurements). **(4.MD.A.1-3)**

**Understanding and Applying Number Systems**

**4.NS.4** I can use strategies to multiply and divide whole numbers. **(4.NBT.B)**

**4.NS.7** I can use my understanding of operations with whole numbers to multiply a fraction by a whole number to solve problems. **(4.NF.B.4, 4.NF.B.4.c)**

**Operations and Algebraic Thinking**

**4.OA.2** I can use the four operations to solve multi-step problems. **(4.OA.A.2)**

**Essential Question and Enduring Understanding Addressed in this Topic:**

**Essential Question**

How does the multiplicative comparison help us to find equivalent measurements?

**Enduring Understanding**

**We can use our knowledge of the multiplicative comparison to find equivalent measurements and move between different units of measurement.** For instance, we know that for every hour, there is 60 minutes. Therefore, we can utilize the multiplication and division relationship to move between hours and seconds. Understanding how measurement units relate to one another allows us to compare more precisely.

<p><b>In Topic C, students will know:</b></p> <ul style="list-style-type: none"> <li>● We can use our knowledge of unit conversions and multiplicative reasoning to solve multi-step problems</li> <li>● There is a relationship between side lengths and the perimeter of a rectangle</li> <li>● Knowing different units of measurement allow us to compare facts about the world around us (example comparing facts about animals)</li> </ul>	<p><b>Topic Vocabulary:</b></p> <p><b>Academic vocabulary</b> Perimeter</p>
<p><b>In Topic C, students will be able to:</b></p> <ul style="list-style-type: none"> <li>● Apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about weight and capacity.</li> <li>● Apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about distances and lengths.</li> <li>● Apply multiplicative reasoning and their knowledge of fractions to solve problems about perimeters of rectangles.</li> <li>● Solve geometric problems using their understanding of length measurements, unit conversion, multiplicative comparison, and addition or subtraction of fractions.</li> <li>● Apply their understanding of multiplication and measurement conversion to compare facts.</li> </ul>	<p><b>Plan for Student Reflection:</b></p> <p><a href="#">Student Journal Prompts and Reflection Practices</a></p> <hr/> <p><b>Plan for Teacher Reflection:</b></p> <p><b>Teacher Journal Reflection Questions:</b></p> <p><b>Lesson 14:</b> Which types of problems seem to be particularly challenging? What supports or modifications might be needed?</p> <p><b>Lesson 15:</b> What misconceptions came to light in today’s lesson?</p> <p><b>Lesson 16:</b> What evidence do you have that students’ ideas about perimeter shifted or broadened as a result of this lesson?</p> <p><b>Lesson 17:</b> In what ways did you show that all student voices are valued and important for collective learning?</p> <p><b>Lesson 18:</b> What aspects of today’s lesson allowed each of your students to see themselves</p>

as capable and competent in reasoning mathematically?

**Utilize additional strategies for Teacher Reflection:**

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

### Topic 3 (Section C) Task Development

Each Topic has its own Task that serves as a roadmap for instruction during the unit. The task follows the [Learning Cycle Model](#) that drives teaching and learning in Naugatuck Public Schools.

<b>Task Title: Topic 3 - Let's Put it to Work</b>	<b>Grade Level and Unit: Fourth Grade, Unit 5</b>
<p><b>Description of Task:</b> In this activity, students use multiplicative comparison and measurement conversion to create true and false statements about the animals. A set of cards with some facts about animals are provided in the blackline master, but students may also research information about animals using reliable Internet resources or books.</p> <p>The purpose of the gallery walk activity is for students to decide if their peers' statements from the previous activity are true or false. In addition to determining the truth of others' statements, students have an opportunity to revisit and revise their statements from the first activity.</p>	<p><b>Purpose of Task:</b> As students discuss and justify their decisions, they share a mathematical claim and the thinking behind it (MP3).</p>
<p><b>Background of Students/Learning Progression:</b> In earlier lessons, students were introduced to several units of weight and capacity (kilograms, grams, pounds, ounces, liters, and milliliters).</p>	<p><b>Ensure all competencies are addressed in the task:</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Yes, all competencies are addressed</li><li><input type="checkbox"/> No - Task needs modification</li></ul>
<p><b>Getting Started:</b></p> <p>Display the following image for students to see:</p>	



Ask students, “If the dimensions of each rectangle is 10 inches by 6 inches, what is the area of each rectangle in the sign? What is the perimeter of each rectangle?”

Provide students with one minute of quiet think time before they share their ideas with a partner. Ask students to share their thinking with the class. As students are sharing their ideas, record their strategies and answers.

### Section C

IM Lesson	<a href="#">L14: Weight and Capacity Measurements</a>	<a href="#">L15: Length Measurements</a>	<a href="#">L16: Compare Perimeters of Rectangles</a>	<a href="#">L17: More Perimeter Problems</a>	<a href="#">L18: Two Truths and a Lie (Optional)</a>
Learning Cycle Model	Making Meaning	Making Meaning	Investigation	Investigation	Create and Produce
Naugatuck Math Competency	4.MD.1, 4.NS.6, 4.OA.2	4.MD.1, 4.NS.6., 4.OA.2	4.MD.1, 4.NS.7, 4.OA.1	4.MD.1,, 4.OA.1	4.MD.1, 4.OA.2
Math Practice Standards	MP7	MP2	MP7	MP2	
Lesson Purpose	The purpose of this lesson is for students to apply their understanding of multiplicative comparison and unit conversion to solve multi-step	The purpose of this lesson is for students to apply their understanding of multiplicative comparison and unit conversion to solve multi-step	The purpose of this lesson is for students to apply multiplicative reasoning and their knowledge of fractions to solve problems about perimeters of rectangles.	The purpose of this lesson is for students to solve geometric problems using their understanding of length measurements, unit conversion, multiplicative	The purpose of this lesson is for students to apply their understanding of multiplication and measurement conversion to compare facts about animals.

	problems about weight and capacity.	problems about distances and lengths.		comparison, and addition or subtraction of fractions.	
<b>Vocabulary Focus</b>	Capacity, gallon, cup, quart, convert	Distance, length	Perimeter	Geometric, quadrilateral	
<b>Lesson Materials/ Resources</b>  <a href="#">Section C Practice Problems</a>	<a href="#">Lesson 14 Slides</a>  <a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Gather a one-gallon jug, a one-quart container, and a one-cup container for display during the launch.</li> <li>On chart paper, create the table in the activity with an extra column for showing the amounts of lassi in cups, to be displayed during synthesis</li> </ul> <a href="#">Lesson 14 Cool-Down More Clay</a>	<a href="#">Lesson 15 Slides</a>  <a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Rulers, Yardstick to display</li> </ul> <a href="#">Lesson 15 Cool-Down A Sculptor and a Tower</a>	<a href="#">Lesson 16 Slides</a>  <a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each group of 2 needs pipecleaners</li> </ul> <b>Activity 2:</b> <ul style="list-style-type: none"> <li>Each group of 2 needs pipecleaners, inch ruler, tape</li> </ul> <b>Activity 3:</b> <ul style="list-style-type: none"> <li>Each group needs rulers, <a href="#">Centimeter Grid Paper - Standard</a></li> </ul> <a href="#">Lesson 16 Cool-Down Rectangles Y and Z</a>	<a href="#">Lesson 17 Slides</a>  <a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 2:</b> <ul style="list-style-type: none"> <li>If the activity is done as a gallery walk, print and cut 1–2 copies of <a href="#">Missing Measurements - Large</a> and post them around the classroom. Otherwise, print and cut 1 copy of <a href="#">Missing Measurements - Small</a> for each group of 3–4 students.</li> </ul> <a href="#">Lesson 17 Cool-Down A Rectangle and a Trapezoid</a>	<a href="#">Lesson 18 Slides</a>  <a href="#">Teacher Presentation Materials</a>  <a href="#">Student Pages</a>  <b>Activity 1:</b> <ul style="list-style-type: none"> <li>Each group of 2 needs index cards, sticky notes, and tape, and a set of <a href="#">Facts About Animals</a></li> </ul> <b>Activity 2:</b> <ul style="list-style-type: none"> <li>Each group needs sticky notes</li> </ul>
<b>Assessment</b>	<b>Formative Assessment Strategies: observation, questioning, student discourse : <a href="#">Monitoring Sheet</a></b> See also <a href="#">Section C Checkpoint Assessment</a> , <a href="#">Section C Checkpoint Teacher’s Guide</a> , <a href="#">Unit 5 Assessment</a> , <a href="#">End of Unit 5 Assessment Teacher Guide</a>				
					<a href="#">Section C Practice Problems</a>
<b>Centers Materials</b>	<a href="#">Can You Draw It? (1–5)</a> , Stage 4: Area and Perimeter (Supporting)  <a href="#">Rectangle Rumble (3–5)</a> ,	<a href="#">Can You Draw It? (1–5)</a> , Stage 4: Area and Perimeter (Supporting)  <a href="#">Rectangle Rumble (3–5)</a> ,	<a href="#">Can You Draw It? (1–5)</a> , Stage 4: Area and Perimeter (Supporting)  <a href="#">Rectangle Rumble (3–5)</a> ,	<a href="#">Can You Draw It? (1–5)</a> , Stage 4: Area and Perimeter (Supporting)  <a href="#">Rectangle Rumble (3–5)</a> ,	<a href="#">Would You Rather? (2–5)</a> , Stage 2: Compare to Smaller Units (Addressing)

	Stage 3: Factors 1–10 (Supporting)	Stage 3: Factors 1–10 (Supporting)	Stage 3: Factors 1–10 (Supporting)	Stage 3: Factors 1–10 (Supporting)	<a href="#">Compare (1–5), Stage 3:</a> Multiply within 100 Supporting
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## Making Meaning

In Lesson 14, students solve problems involving the units of capacity they worked with in grade 3. They use their knowledge of unit conversion and multiplicative reasoning to solve multi-step problems. Students may need to review the measurement units used in this lesson before the lesson to ensure access to the tasks.

Previously, students reasoned multiplicatively about measurements and performed unit conversions to solve problems in the context of mass and capacity. In Lesson 15, they do the same in the context of length measurements, using familiar customary units from earlier grades (yards, feet, and inches).

### [Lesson 14: Weight and Capacity Measurements](#)

- The purpose of this lesson is for students to apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about weight and capacity.
- [Teacher Presentation Materials](#)
- [Lesson 14 Slides](#)

### [Lesson 15: Length Measurements](#)

- The purpose of this lesson is for students to apply their understanding of multiplicative comparison and unit conversion to solve multi-step problems about distances and lengths.
- [Teacher Presentation Materials](#)
- [Lesson 15 Slides](#)

## Investigation:

Lesson 16 reinforces students' understanding of the relationship between the side lengths and the perimeter of a rectangle and their ability to reason multiplicatively in a geometric context.

In a previous lesson, students were reminded about the relationship between the side lengths and the perimeter of a rectangle and reasoned multiplicatively to solve problems about those measurements. In Lesson 17, they continue to do so but in contexts that require them to convert the units and interpret them. Students also consider the perimeter of other quadrilaterals.

### [Lesson 16: Compare Perimeters and Rectangles](#)

- The purpose of this lesson is for students to apply multiplicative reasoning and their knowledge of fractions to solve problems about perimeters of rectangles.
- [Teacher Presentation Materials](#)
- [Lesson 16 Slides](#)

### [Lesson 17: More Perimeter Problems](#)

- The purpose of this lesson is for students to solve geometric problems using their understanding of length measurements, unit conversion, multiplicative comparison, and addition or subtraction of fractions.
- [Teacher Presentation Materials](#)
- [Lesson 17 Slides](#)

### **Create and Produce:**

This lesson is optional because it does not address any new mathematical content standards. This lesson does provide students with an opportunity to apply precursor skills of mathematical modeling. In this lesson, students write true and false statements involving multiplicative comparisons and unit conversions. They have an opportunity to choose the animals to compare and which facts to use.

Then, students determine which of their classmates' statements are true and which are false. At the end of this activity, they have an opportunity to revise their earlier statements to make them clearer or stronger.

### [Lesson 18: Two Truths and a Lie](#)

- The purpose of this lesson is for students to apply their understanding of multiplication and measurement conversion to compare facts about animals.
- [Teacher Presentation Materials](#)
- [Lesson 18 Slides](#)

### **Communicate and Present:**

### **Reflection:**

<p>Invite students to share how they identified false statements and thought about revising the statements.</p>	<p>Today we wrote some true or false statements and figured out if others' statements were true or false.</p> <p>"How was the experience of creating true and false statements in today's activity different from other experiences?" (I had to use the information to come up with something that was true and can be supported by the data and something that was wrong.)</p> <p>"What was interesting? What was challenging about this experience?"</p>
<p><b>Notes:</b></p>	<p><b>Complete File with Resources and Task:</b></p> <p>Task-Based Learning Plan for Topic 3</p>