



**Bluebonnet
Learning**
K-5 Math
EDITION 1

ENGLISH

Grade 1

Module 3

**ORDERING AND COMPARING LENGTH
MEASUREMENTS AS NUMBERS**

TEACHER EDITION

Teacher Edition

K–5 Math

Grade 1

Module 3

**ORDERING AND COMPARING LENGTH
MEASUREMENTS AS NUMBERS**

Acknowledgment

Thank you to all the Texas educators and stakeholders who supported the review process and provided feedback. These materials are the result of the work of numerous individuals, and we are deeply grateful for their contributions.

Notice

These learning resources have been built for Texas students, aligned to the Texas Essential Knowledge and Skills, and are made available pursuant to Chapter 31, Subchapter B-1 of the Texas Education Code.

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Ordering and Comparing Length Measurements as Numbers

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Simple
↓
Complex

4 days

3 days

4 days

End of Module → 2 days

Total Days

13 days

New Terms/Recent

- Bar Graph
- centimeter
- centimeter cube
- centimeter ruler
- data
- end points
- graph
- length unit
- poll
- table
- tally marks



Grade 1 • Module 3

Ordering and Comparing Length Measurements as Numbers

OVERVIEW

Grade 1 Module 3 opens with **Topic A, Lesson 1** by extending students' Kindergarten experiences with measurement tools to reinforce the continuous nature of linear measurement. Lessons 2-4 take longer than and shorter than to a new level of precision by introducing the idea of a length unit. Centimeter cubes are laid alongside the length of an object as students learn that the total number of cubes laid end to end with no gaps or overlaps represents the length of that object (1.7A, 1.7B, 1.7C, 1.7D). The Sequence of Grade 1 Modules Aligned with the TEKS section of the Course Guide explains the importance of teaching standard units to Grade 1 students before non-standard units. Thus, Grade 1 students learn about the centimeter before exploring non-standard units of measurement in this module. Lining the cubes up to the ruler allows students to see that they are using units that relate to a tool found around the world. One of the primary reasons we recognize standard units is because they are ubiquitous and appear on rulers at homes in Houston, in schools in San Antonio, and in local shops in Texas' historic town squares. Students ask and answer the question, "Why do we use a standard unit to measure?" The topic closes with students measuring and comparing sets of three items using centimeter cubes and making precise statements such as, "The pencil measures 10 centimeters. The crayon measures 6 centimeters. The book measures 20 centimeters. I can put them in order from shortest to longest: the crayon, the pencil, the book. The book is longer than the pencil, and the pencil is longer than the crayon, so the book is longer than the crayon" (1.7A).

Topic B explores the usefulness of measuring with similar units. Students measure the same objects from **Topic A** using two different non-standard units, toothpicks and small paper clips, simultaneously to measure one object and answer the question, "Why do we measure with same-sized length units?" (1.7A, 1.7B, 1.7C, 1.7D). They realize that using iterations of the same unit will yield consistent measurement results. Similarly, students explore what it means to use a different unit of measurement from their classmates. It becomes obvious to students that if we want to have discussions about the lengths of objects, we must measure with the same units. Students answer the question, "If Bailey uses paper clips and Maya uses toothpicks, and they both measure things in our classroom, will they be able to compare their measurements?" With this new understanding of consistent measurement, **Topic B** closes with students solving compare with difference unknown problems. Students use standard units to answer such questions as, "How much longer is the pencil than the marker?" (1.3B, 1.5D).

Topic C closes the module as students represent and interpret data (1.8A, 1.8B, 1.8C). They collect data about their classmates and sort that information into three categories. Using same-sized pictures on squares, students represent this sorted data so that it can be easily compared and described. Students interpret information presented in the graphs by first determining the number of data points in a given category, for example, "How many students like carrots the best?" Then, students combine categories, for example, "How many total students like carrots or broccoli the best?" The module closes with students asking and answering varied questions about data sets, such as "How many students were polled in all?" (join with result unknown) and "How many more students preferred broccoli to string beans?" (compare with difference unknown) (1.3B,

Topic A
extending
under experience
1/measurement
tools
L2-4
shorter/longer
than
length unit
cm cubes laid
alongside object
represents the
length of
object

Topic B
usefulness
of measuring
w/ similar
units
students
measure same
objects from
Topic A using
2 different
non-standard
units
They realize
using iterations
of the same
size units
yields consistent
measurement
results

Topic A
closes w/
the student
comparing
lengths

Topic B
closes w/
students
solving compare
w/ different
unknown

Topic C
students
represent &
interpret
data
collect
classroom
data



Module 3: Ordering and Comparing Length Measurements as Numbers

- Students interpret info by:
1. determining number of data points in given category
 2. combine categories
 3. asking and answering varied questions about data sets

represent same-sized pictures on squares

Big Connection

work w/ units representing data points is an application of their work w/ length as the students observe each square can be interpreted as length unit

1.5D). Their work with units representing data points is an application of students' earlier work with length as they observe that each square can be lightly interpreted as a length unit, which helps them analyze the data.

Throughout Module 3 students engage with the TEKS mathematical process standards by using various measurement tools, such as centimeter cubes, paper clips, meter sticks, and yarn to record and communicate both standard and non-standard length measurements. Additionally, when students create and use tables, picture graphs, and bar graphs to organize, record, and ask and answer questions about data, they are creating and using representations to organize, record, and communicate mathematical ideas (1.1E). In this module, students continue to analyze mathematical relationships to connect and communicate mathematical ideas (1.1F). For example, students first compare lengths by using centimeter cubes to concretely experience the compare with difference unknown problem type. Then students analyze information presented in tables, picture graphs, and bar graphs to explore compare with difference unknown problems. They use their understanding of comparing lengths to compare the data, thus analyzing the mathematical relationship to connect ideas. Additionally, in Module 3, students use precise mathematical language to display, explain and justify mathematical ideas and arguments (1.1G). Students use precise measurement language both in writing and through discussion to express the length of objects, and to explain and justify the need to measure using consistent units.

engage in process standards various measurement tools
 • create + use tables, picture graphs, bar graphs

→ organize, record, + communicate math ideas
 → analyze + compare

Collaboratively Troubleshooting Student Misconceptions

It is common for students to make mistakes as they build their understanding of new or difficult concepts. As noted in the Program and Implementation Guide, collaborative troubleshooting is a routine to help teachers address students' misconceptions. The three steps to collaborative troubleshooting are

- (1) surface student thinking;
- (2) validate what the student did right; and
- (3) bridge to a better understanding.

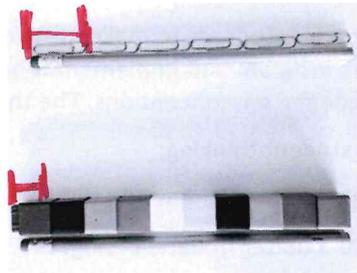
The following table presents teachers with guidance on how to collaboratively troubleshoot misconceptions with students. The first three columns of the table outline misconceptions that commonly arise in this module, reasons why students may have the misconceptions, and associated TEKS. Teachers can use this information to help them decide which questions to ask students to surface thinking and to validate what the students understood or did correctly.

The last column of the table provides instructional strategies and sample guided questions that can support students as they build on what they already know and bridge to a better understanding.

Note: Teachers can also refer to the sample teacher–student dialogue in the “Collaboratively Troubleshooting Student Misconceptions” section of the Grade 1 Course Guide for additional guidance on implementing the three-step routine.

C	R	A
<ul style="list-style-type: none"> - real objects - standard units - non-standard units - centimeter cubes, rulers, meter sticks 	<ul style="list-style-type: none"> - draw + represent lengths pics + measurement marks - connect pics + ruler marks to centimeters 	<ul style="list-style-type: none"> - solve + reason using numbers, symbols, equations
<ul style="list-style-type: none"> - connect same sized pictures to same sized squares (measurement) 	<ul style="list-style-type: none"> - picture + bar graph 	



Topic	TEKS	Student Misconception	How to Bridge to a Better Understanding
Topic A	1.7A	<p>Students do not understand that length is a distance (e.g., 5 units means the fifth cube I put down when I measure).</p> <p><i>* do not understand length as a distance</i></p>	<p>Notice how counting 5 when measuring does not mean just the fifth length unit itself. 5 means the space, or distance, covered by 5 length-units.</p> <p>Encourage students to include units when counting the length of an object, for example, "1 centimeter cube, 2 centimeter cubes, 3 centimeter cubes..."</p> <p>Probe for understanding when students tell the length of an object by asking, "What does the fifth cube tell us?"</p> <p><i>count with units</i></p>
Topic B	1.7C	<p>Students solely depend on counting units to determine the length of an object, rather than considering the size of the units used to measure (e.g., "I can count how many length-units to tell which object is longer").</p> <p><i>* students depend on unit counts + do not consider sizing of units</i></p> <p><i>* pencil - 6 paper clips</i> <i>10 linking cubes</i></p>	<p>Have students measure an object by using units of difference sizes, such as linking cubes and paper clips, and ask, "Which object is longer? How do you know?"</p>  <p>Students should see that the objects are the same length, even though Pencil A, for example, is 6 paper clips long and Pencil B is 10 linking cubes long. Encourage students to explain their thinking by drawing their attention to the size of the unit they used to measure.</p>
Topic C	1.8B	<p>Students do not organize and align data points in the graph (e.g., Graphs don't help you to see and understand information better).</p> <p><i>* students do not organize + align</i></p>	<p>Notice how using concrete materials, such as same-size square tiles or linking cubes, can help students organize data visually, and ensure one-to-one matching between data points across categories.</p> <p>Encourage students to use their measurement skills to align data points with no gaps or overlaps.</p>

data points (no gaps or overlaps)



Focus Grade Level Standards

Number and Operations

The student applies mathematical process standards to develop and use strategies for whole number addition and subtraction computations in order to solve problems. The student is expected to:

- 1.3B (SS) use objects and pictorial models to solve word problems involving joining, separating, and comparing sets within 20 and unknowns as any one of the terms in the problem such as $2 + 4 = []$; $3 + [] = 7$; and $5 = [] - 3$.

Algebraic Reasoning

The student applies mathematical process standards to identify and apply number patterns within properties of numbers and operations in order to describe relationships. The student is expected to:

- 1.5D (RS) represent word problems involving addition and subtraction of whole numbers up to 20 using concrete and pictorial models and number sentences.

Geometry and Measurement

The student applies mathematical process standards to select and use units to describe length and time. The student is expected to:

- 1.7A (SS) use measuring tools to measure the length of objects to reinforce the continuous nature of linear measurement;
- 1.7B (SS) illustrate that the length of an object is the number of same-size units of length that, when laid end-to-end with no gaps or overlaps, reach from one end of the object to the other;
- 1.7C (SS) measure the same object/distance with units of two different lengths and describe how and why the measurements differ;
- 1.7D (RS) describe a length to the nearest whole unit using a number and a unit.



Data Analysis

The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to: The student applies mathematical process standards to organize data to make it useful for interpreting information and solving problems. The student is expected to:

- 1.8A (SS) collect, sort, and organize data in up to three categories using models/representations such as tally marks or T-charts;
- 1.8B (SS) use data to create picture and bar-type graphs;
- 1.8C (RS) draw conclusions and generate and answer questions using information from picture and bar-type graphs.

Foundational Standards

The student is expected to:

- K.2D recognize instantly the quantity of a small group of objects in organized and random arrangements;
- K.2E generate a set using concrete and pictorial models that represents a number that is more than, less than, and equal to a given number up to 20;
- K.2G compare sets of objects up to at least 20 in each set using comparative language;
- K.2H use comparative language to describe two numbers up to 20 presented as written numerals;
- K.7A give an example of a measurable attribute of a given object, including length, capacity, and weight;
- K.7B compare two objects with a common measurable attribute to see which object has more of/less of the attribute and describe the difference.

TEKS Mathematical Process Standards

The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:

- 1.1E create and use representations to organize, record, and communicate mathematical ideas;
- 1.1F analyze mathematical relationships to connect and communicate mathematical ideas;
- 1.1G display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.



Overview of Module Topics and Lesson Objectives

TEKS	ELPS	Topics and Objectives	Days
1.7A 1.7B 1.7C 1.7D	2.I 3.E 3.G 4.F 4.G 5.B	A Standard Length Units Lesson 1: Use measuring tools to measure the length of objects to reinforce the continuous nature of linear measurement. Lesson 2: Express the length of an object using centimeter cubes as length units to measure with no gaps or overlaps. Lesson 3: Rename and measure with centimeter cubes, using their standard unit name of centimeters. Lesson 4: Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving <i>compare with difference unknown</i> word problems.	4
1.3B 1.5D 1.7A 1.7B 1.7C 1.7D	2.C 2.E 2.I 3.E 3.H 4.G 5.B	B Non-Standard and Standard Length Units Lesson 5: Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit. Lesson 6: Understand the need to use the same units when comparing measurements with others. Lesson 7: Answer <i>compare with difference unknown</i> problems about lengths of two different objects measured in centimeters.	3
1.3B 1.5D 1.8A 1.8B 1.8C	1.A 2.F 3.F 4.G 5.B	C Data Interpretation Lessons 8–9: Collect, sort, and organize data; then ask and answer questions about the number of data points. Lessons 10–11: Ask and answer varied word problem types about a data set with three categories.	4
		End-of-Module Assessment Task: Topics A–C	2
Total Number of Instructional Days			13

* measure same objects from Topic E

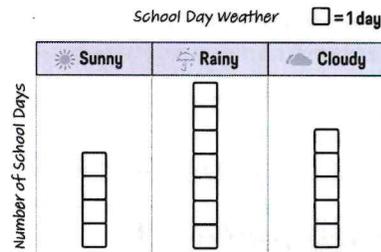


Terminology

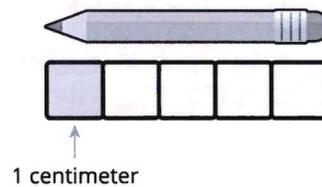
A Spanish cognate is included when the term has a similar meaning and spelling in English. Not every term in this module has a Spanish cognate.

New or Recently Introduced Terms

- **Bar graph** (*Gráfica de barras*): a graph that shows the value of each category with bars shaped like rectangles



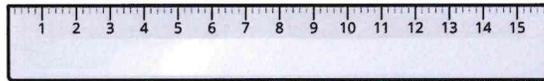
- **Centimeter** (*Centímetro*): a unit used to measure length



- **Centimeter cube** (*Cubo de un centímetro*): a tool used to measure how many centimeters long something is



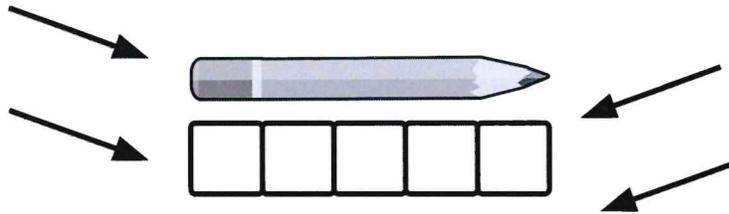
- **Centimeter ruler:** a tool used to measure length using length units of centimeters



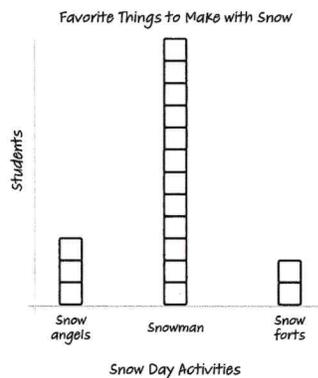
- **Data (Datos):** collected information

Fruit	Tally Marks	Votes
Apple		2
Strawberry		4
Banana		8

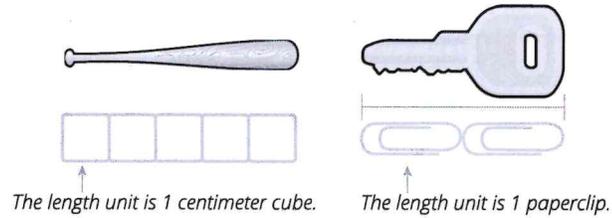
- **Endpoint:** the beginning or end of an object



- **Graph (Gráfica):** a way to sort and show information



- **Length unit:** an equal-sized unit that tells us what we are measuring by



- **Poll:** asking people the same questions and keeping count of their answers
- **Table: (Tabla):** a chart that shows data

Favorite Type of Book

Fairy Tales	
Science Books	
Poetry Books	

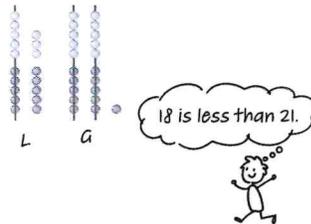
||| = 5 students

- **Tally marks:** lines used to write down the number of things; tallies can be in groups of 5, where the fifth tally always goes across the other four tallies

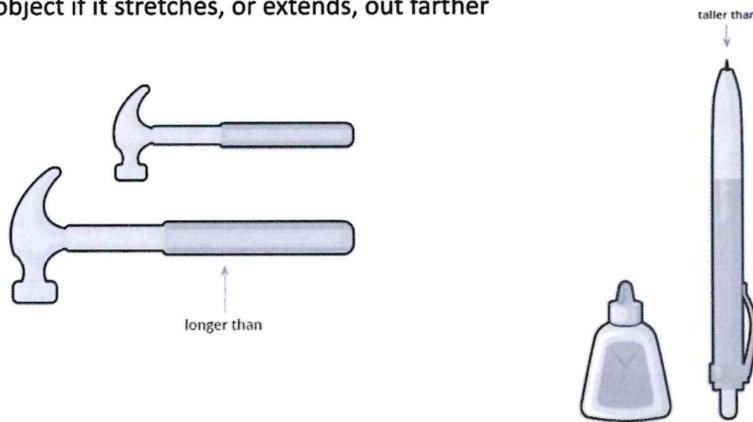


Familiar Terms and Symbols¹

- **Less than:** when comparing two numbers, the smaller number is less



- **Longer than/taller than:** when comparing lengths of objects, an object is longer or taller than another object if it stretches, or extends, out farther

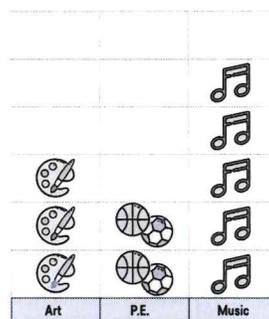


- **More than:** when comparing two numbers, the greater number is more

$$18 < 21$$

21 is more than 18.

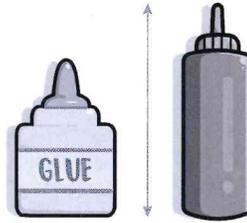
- **Picture graph:** a way to sort and show information by using pictures



¹These are terms and symbols students have seen previously.



- **Shorter than:** when comparing lengths of objects, an object is shorter than another object if the other object stretches out farther or higher



The glue is shorter than the ketchup.

Suggested Tools and Representations

- Centimeter cubes
- Centimeter rulers (simply for the purpose of naming the centimeter)
- Non-standard units (toothpicks, small and large paper clips)
- String lengths of about 25 centimeters
- Tally marks

Module 3 Lesson Overview Materials List

Lesson	Teacher Materials	Student Materials <i>All counts are per student unless otherwise indicated.</i>
1	5-group row cards (T)* Ant and elephant image (T) Gift box Various measuring tools such as centimeter cubes, paper clips, meter sticks, and meter tapes A ball of yarn or string Scissors Masking tape	Personal white board 5-group row (T) 10-inch piece of yarn
2	Timer Place value cards, enlarged (T) New crayon (9 cm) Unsharpened pencil (19 cm) Small glue stick (8 cm) Dry erase marker (12 cm) Centimeter cubes	1 die (per student pair) Personal white board Bag with 20 centimeter cubes Bag with new crayon, unsharpened pencil, small glue stick, dry erase marker, jumbo craft stick (15 cm), and small paper clip (3 cm) Measurement recording sheet (T)



Lesson	Teacher Materials	Student Materials <i>All counts are per student unless otherwise indicated.</i>
3	Centimeter cubes String Scissors Centimeter ruler	2 dice (per student pair) Bag with centimeter cubes (per student pair) Centimeter ruler (per student pair)
4	Timer Unsharpened pencil (19 cm) New crayon (9 cm) Small paper clip (3 cm) Dry erase marker (12 cm) Jumbo craft stick (15 cm) New colored pencil (17 cm) Centimeter cubes	Numeral cards 0–10 (T) Counters Personal white board Bag with centimeter cubes Bag with various classroom objects (see Lesson 2)
5	Place value cards (T) Chart paper 3 new pencils of different colors, all the same length Mixed set of large and small paper clips	Bag of 20 large paper clips and 20 small paper clips
6	Timer Chart with measuring rules (see Lesson 5) Cube larger than a linking cube Cube smaller than a centimeter cube	Personal white board 1 die (per student pair) 1 bag of 2 new crayons, 10 linking cubes, 10 centimeter cubes (per student pair) Bag of 20 large paper clips (per student pair) Bag of 20 small paper clips (per student pair) Bag of 20 toothpicks (per student pair) Bag of 20 centimeter cubes (per student pair)
7	Centimeter cube Board eraser Ruler New pencil New crayon Large paper clip Small paper clip Linking cube Pencil eraser 2 different colors of centimeter cubes Dry erase marker Jumbo craft stick Glue stick New colored pencil Chart with measuring rules (see Lesson 5)	1 die (per student pair) Bag with 20 blue and 20 yellow centimeter cubes Bag with various classroom objects (see Lesson 2) New colored pencil



Lesson	Teacher Materials	Student Materials <i>All counts are per student unless otherwise indicated.</i>
8	Centimeter cube Board eraser Ruler New pencil New crayon Large paper clip Small paper clip Linking cube Pencil eraser Place value cards (T) 3 pieces of chart paper	Personal white board 1 Jumbo craft stick Marker
9	Chart paper Class list	Clipboard Class list
10	20-bead Rekenrek Chart paper Chart with measuring rules (see Lesson 5) <i>Favorite Read Aloud Books</i> chart (see Lesson 8) Fruit picture cards (T)	Numeral cards 0–10 (T) Counters Personal white board
11	Place value cards (T) Chart paper with <i>Favorite Things to Do at the Beach</i> bar graph Sticky notes Park picture (T) Bar graph (T)	3 dice (per student pair) Personal white board Park picture (T) Bar graph (T)

*(T) Template provided in TE, Practice, and/or Learn

