

Kenmore-Town of Tonawanda UFSD

We educate, prepare, and inspire all students to achieve their highest potential

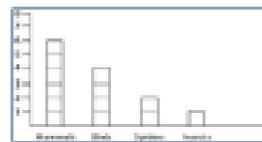


Grade 2 Module 7 Parent Handbook

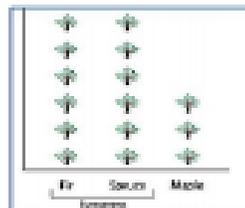
The materials contained within this packet have been taken from the Great Minds curriculum Eureka Math.

Problem Solving with Length, Money, and Data

Module 7 presents an opportunity for students to practice addition and subtraction strategies within 100. They also use problem-solving skills as they learn to work with various types of units within the contexts of length, money, and data. Students will represent categorical and measurement data using picture graphs, bar graphs, and line plots.



Bar Graph



Picture Graph

New Terms in this Module:

Bar graph—diagram showing data using lines or rectangles of equal width

Data—facts assembled for analysis or information

Degree—unit of temperature measure

Foot—ft, unit of length measure equal to 12 inches

Inch—in, unit of length measure

Legend—notation on a graph explaining what symbols represent

Line plot—graph representing data with an X above each instance of value on a number line

Picture graph—representation of data like a bar graph, using pictures instead of bars

Scale—system of ordered marks at fixed intervals used as a reference standard in measurement

Table—representation of data using rows and columns

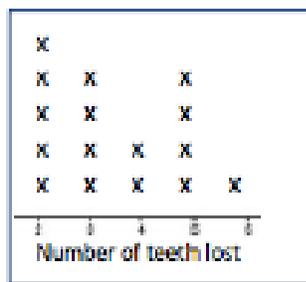
Yard—yd, unit of length measure equal to 36 inches or 3 feet

What Came Before this

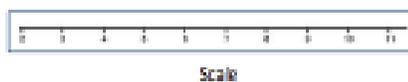
Module: In module 6, we laid the conceptual foundation for multiplication and division in Grade 3. Students made equal groups and learned about even and odd numbers.

What Comes After this

Module: In module 8, students extend their understanding of part-whole relationships through the lens of geometry. They compose and decompose shapes and begin to see unit fractions as equal parts of a whole.



Line Plot



Scale

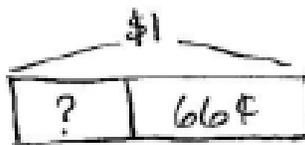
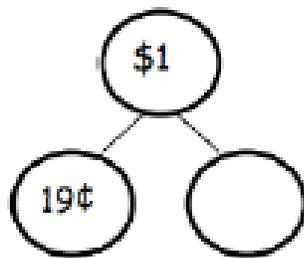
+ How You Can Help at Home:

- Ask your student to count the coins received in change when shopping or to count a handful of coins at home.
- Once students have learned a few ways of representing data, find something around the house you can make a line or bar graph about, e.g., types of stuffed animals, colors of LEGO pieces, etc.

Key Common Core Standards:

- *Use place value understanding and properties of operations to add and subtract.*
- *Measure and estimate lengths in standard units.*
- *Relate addition and subtraction to length.*
- *Work with time and money.*
- *Represent and interpret data.*

A number bond and tape diagram both showing how students will work on addition and subtraction with money as the context



$$100 - \square = 66$$

$$66 \xrightarrow{+4} 70 \xrightarrow{+30} 100$$

Spotlight on Math Models:

Money

Students will use this model in Module 7 of *A Story of Units* as they work with measurement.

A Story of Units has several key mathematical “models” that will be used throughout a student’s elementary years.

In Module 7, students work with various units of measurement, one of which the most exciting is money. Students see how 100¢ can be decomposed various ways, and they use the familiar number bond and tape models to demonstrate addition and subtraction problems. Place value concepts are reinforced as we review that one hundred 1¢ coins and ten 10¢ coins both make \$1.

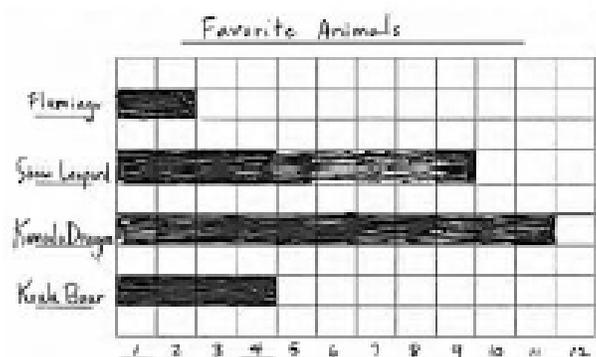
We also work with bills, which is very similar to our work with whole number addition and subtraction. A typical problem is as follows:

Ryan went shopping with 3 twenty-dollar bills, 3 ten-dollar bills, 1 five-dollar bill, and 9 one-dollar bills. He spent 59 dollars on a video game. How much money did he have left?

This problem showcases the accumulated skills needed to both compute the mathematics, as well as handle the multi-step nature of the work. These Grade 2 math students have learned so much!

Sample Problem from Module 7, Lesson 4:
After a trip to the zoo, Ms. Anderson’s students voted on their favorite animals. Use the bar graph to answer the following questions.

- Which animal got the fewest votes?
- Which animal got the most votes?
- How many more students liked komodo dragons than koala bears?
- Later, two students changed their votes from koala bear to snow leopard. What was the difference between koala bears and snow leopards then?



Problem Solving with Length, Money, and Data

OVERVIEW

Module 7 presents an opportunity for students to practice addition and subtraction strategies within 100 and problem-solving skills as they learn to work with various types of units within the contexts of length, money, and data. Students represent categorical and measurement data using picture graphs, bar graphs, and line plots. They revisit measuring and estimating length from Module 2 but now use both metric and customary units.

Module 7 opens with students representing and interpreting categorical data. In Grade 1, students learned to organize and represent data with up to three categories. Now, in Grade 2, students build upon this understanding by drawing both picture and bar graphs (**2.MD.10**). First, they record category counts in a table, solving problems based on the information in the table. Next, they draw picture graphs in which each picture represents one object. Finally, they represent the same data set in the form of a bar graph, where one axis names the categories and the other shows a single-unit count scale. Students use the information to solve *put together*, *take apart*, and *compare* problems (**2.MD.10**), making connections to finding sums and differences on a number line diagram. In the final lesson of Topic A, students display money data in the form of a bar graph, thus establishing a connection to word problems with coins in Topic B.

In Topic B, students work with the most popular units of all: bills and coins. Students apply their knowledge of coin values, place value strategies, and the properties of operations to solve addition and subtraction word problems (**2.NBT.5**, **2.MD.8**) to find the total value of a group of coins or bills. Next, they use coins to find multiple ways to represent the same quantity, sometimes using the fewest number of coins. Students then focus on the decomposition of a dollar, where they see that this unit behaves like all others they have seen before (e.g., 100 ones = 1 hundred, 100 cm = 1 m). Students learn how to make change from one dollar using counting on, simplifying strategies (e.g., number bonds), and the relationship between addition and subtraction. As students use coins or bills to solve addition and subtraction word problems within 100, they use drawings and equations to represent the unknown in various situations. The Application Problems throughout this module include solving two-step word problems involving two-digit money amounts (e.g., $\$28 + \47 or $28\text{¢} + 47\text{¢}$), as students use this new context to increase fluency with addition and subtraction within 100 (**2.NBT.5**).

After the Mid-Module Assessment, Topic C reviews the measurement concepts and skills presented in Module 2, now with a focus on customary units. Students deepen their understanding of a *length unit* as they lay one-inch square tiles end-to-end to create simple inch rulers, just as they created centimeter rulers in Module 2. They see again that the smaller the unit, the more iterations are necessary to cover a given distance. Students measure the length of various objects with their new unit rulers (**2.MD.1**), applying important concepts such as the understanding that the zero point on a ruler is the beginning of the total length and the number on a ruler means the distance covered by that number of length units.

In Topic D, students apply their measurement skills and knowledge of the ruler to measure a variety of objects using the appropriate measurement tools, such as inch rulers and yardsticks, just as they measured with centimeter rulers, meter sticks, and meter tapes in Module 2 (**2.MD.1**). Students thereby add to their bank of benchmark lengths, such as an inch being the distance across a quarter. By doing so, students develop mental images of an inch, a foot, or a yard, which empowers them to estimate a given length (**2.MD.3**).

In addition, in Topic D, students measure objects using both metric and customary length units, thereby developing an understanding of how the number of units needed depends upon the size of the unit chosen (**2.MD.2**). As in Topic C, students recognize, for example, that the smaller the length unit, the more iterations are necessary to cover a given distance. Topic D concludes with students measuring to determine how much longer one object is than another (**2.MD.4**). Students use addition and subtraction to compare two lengths, subtracting the length of the shorter object from the length of the longer object to determine the difference (e.g., $40\text{ in} - 35\text{ in} = 5\text{ in}$, or $35\text{ in} + \underline{\hspace{1cm}} = 40\text{ in}$).

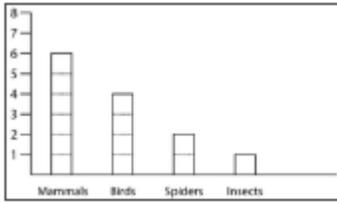
Whereas in Topic D students used rulers to compare lengths, in Topic E, students use drawings (e.g., tape diagrams and number bonds) and equations with an unknown to represent addition and subtraction word problems (**2.MD.5**). Once they have a solid conceptual understanding of length, students are ready to represent whole numbers as lengths on a number line (**2.MD.6**) and apply their knowledge of the ruler to a number line diagram. In Topic E, they are asked to identify unknown numbers on a number line by using place value, reference points (e.g., 5, 10, 25, and 50), and the distance between points. Students are also asked to represent two-digit sums and differences using the number line as a measurement model for combining and comparing lengths.

Topic F follows naturally, with students generating measurement data and representing it with a line plot (**2.MD.9**). Students position data along a horizontal scale with whole number markings, drawn as a number line diagram (**2.MD.6**). Since students are working with length, the scale on their line plots corresponds to the scale on their rulers. After generating measurement data, students create line plots from different data sets, and then they discuss and interpret the results.

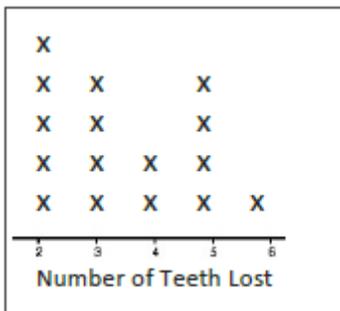
Terminology

New or Recently Introduced Terms

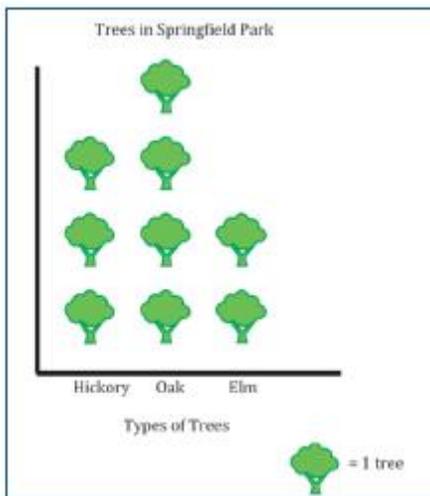
- Bar graph (pictured below)



- Category (a group of people or things sharing a common characteristic; e.g., bananas are in the fruit category)
- Data (a set of facts or pieces of information)
- Degree (unit used to measure temperature, e.g., degrees Fahrenheit)
- Foot (ft, a unit of length equal to 12 inches)
- Inch (in, a unit of length)
- Legend (the notation on a graph explaining what symbols represent)
- Line plot (a graphical representation of data—pictured below)



- Picture graph (a representation of data like a bar graph, using pictures instead of bars—pictured below)



- Scale (a number line used to indicate the various quantities represented in a bar graph—pictured below)



- Survey (collecting data by asking a question and recording responses)

- Symbol (a picture that represents something else)
- Table (a representation of data using rows and columns)
- Thermometer (a tool used to measure temperature)
- Yard (yd, a unit of length equal to 36 inches or 3 feet)

Familiar Terms and Symbols

- Benchmark number (e.g., numbers like the multiples of 10)
- Centimeter (cm, a unit of length measure)
- Cents (e.g., 5¢)
- Coins (e.g., penny, nickel, dime, and quarter)
- Compare
- Compose
- Decompose
- Difference
- Dollars (e.g., \$2)
- Endpoint
- Equation
- Estimation (an approximation of the value of a quantity or number)
- Hash mark (the marks on a ruler or other measurement tool)
- Height
- Length
- Length unit
- Meter (m, a unit of length measure)
- Meter strip, meter stick
- Number bond
- Number line (a line marked at evenly spaced intervals)
- Overlap (to extend over or cover partly)
- Ruler
- Tally mark
- Tape diagram
- Unit
- Value

Suggested Tools and Representations

- Bar graph (representation of data)
- Centimeter cube
- Centimeter ruler
- Dice
- Grid paper
- Inch and centimeter ruler
- Inch tiles
- Line plot
- Measuring tape
- Meter stick
- Money (i.e., dollars, coins)
- Number bond
- Number line
- Personal white board
- Picture graph
- Table
- Tape diagram
- Yardstick

Grade 2 Module 7 Topic A

Problem Solving with Categorical Data

Focus Standard:

2.MD.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

Instructional Days Recommended: 5

In Topic A, student work revolves around categorical data, which is produced by sorting objects or information into categories. For example, students learn about categories of animal classes and habitats and then record that data in a table. Students also learn to use picture graphs and bar graphs to organize and represent the data in as many as four categories (**2.MD.10**). They learn that this organizing of information makes it easier to compare data and can help them solve problems.

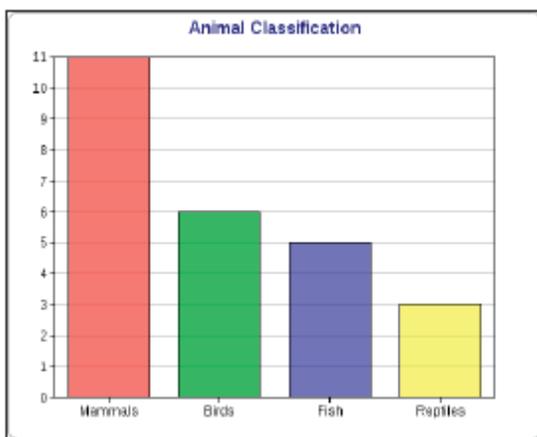
In Lesson 1, working within a science context, students categorize animals into classes (mammals, birds, fish, and reptiles), organize them in the form of a table, and then use the category counts to solve simple *put together*, *take apart*, and *compare* word problems (**2.MD.10**). Students then repeat the process, sorting animals by habitat to create a second data set. They record category counts in the tables with both numerals and tally marks (see the images below).

Animal Habitats		
Arctic	Ocean	Woodland
		

Animal Classification			
Birds	Fish	Mammals	Reptiles
6	5	11	3

In Lesson 2, students learn to draw and label a picture graph using the data from Lesson 1. Grid paper provides support as students construct these graphs. They learn that a graph can be oriented horizontally or vertically and that each picture represents one object.¹ Students ask and answer questions based on the information displayed in the graphs. Following the same procedure and using the same data as in Lesson 2, students learn to draw and label a bar graph in Lesson 3. They learn that one axis names the category, while the other shows a single-unit count scale. As students ask and answer questions based on the data in the graphs, they relate the count scale to finding sums and differences on a number line diagram. In Lesson 4, students continue working with bar graphs to represent new data sets and solve simple word problems.

Topic A culminates in Lesson 5 as students display money data in a bar graph and use the data to solve word problems. This leads into problem solving with coins in Topic B.



**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 1

Objective: Sort and record data into a table using up to four categories; use category counts to solve word problems.

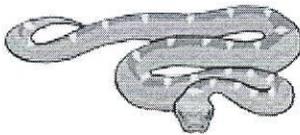
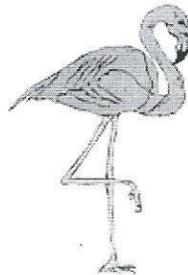
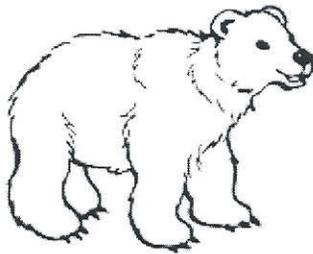
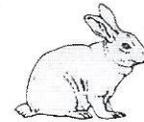
Homework Key

1. 1; 3; 3
2. 4; 3
3. a. 6
b. 20
c. 5
d. 8
e. 26
4. a. 31
b. 1
c. 49
d. 3

Homework Sample

1. Count and categorize each picture to complete the table with tally marks.

No Legs	2 Legs	4 Legs
1	3	3



Lesson 2

Objective: Draw and label a picture graph to represent data with up to four categories.

Homework Key

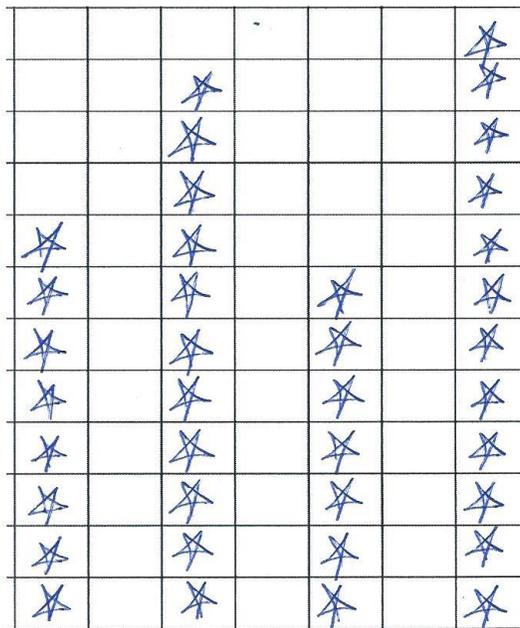
- Correctly completed picture graph with title, categories, and legend
 - 4
 - 2
 - 3
 - Answers will vary.
- Correctly completed picture graph with title, categories, and legend
 - 8
 - 15
 - Answers will vary.

Homework Sample

- Use grid paper to create a picture graph below using data provided in the table. Then, answer the questions.

Favorite Mammals			
Tiger	Panda	Snow Leopard	Gorilla
8	11	7	12

Title: Favorite Mammals



- How many more people chose gorilla as their favorite mammal than chose tiger? 4

- How many more people chose tiger and gorilla as their favorite mammals than panda and snow leopard? 2

- How many fewer people chose tiger as their favorite mammal than panda? 3

Handwritten notes: $8+12=20$ and $11+7=18$

Handwritten notes: $11-8=3$

Tiger Panda Snow Leopard Gorilla

Legend: ★ = 1 person

- Write and answer your own comparison question based on the data.

Question: How many fewer people chose gorilla than panda?

Answer: 1

Lesson 3

Objective: Draw and label a bar graph to represent data; relate the count scale to the number line.

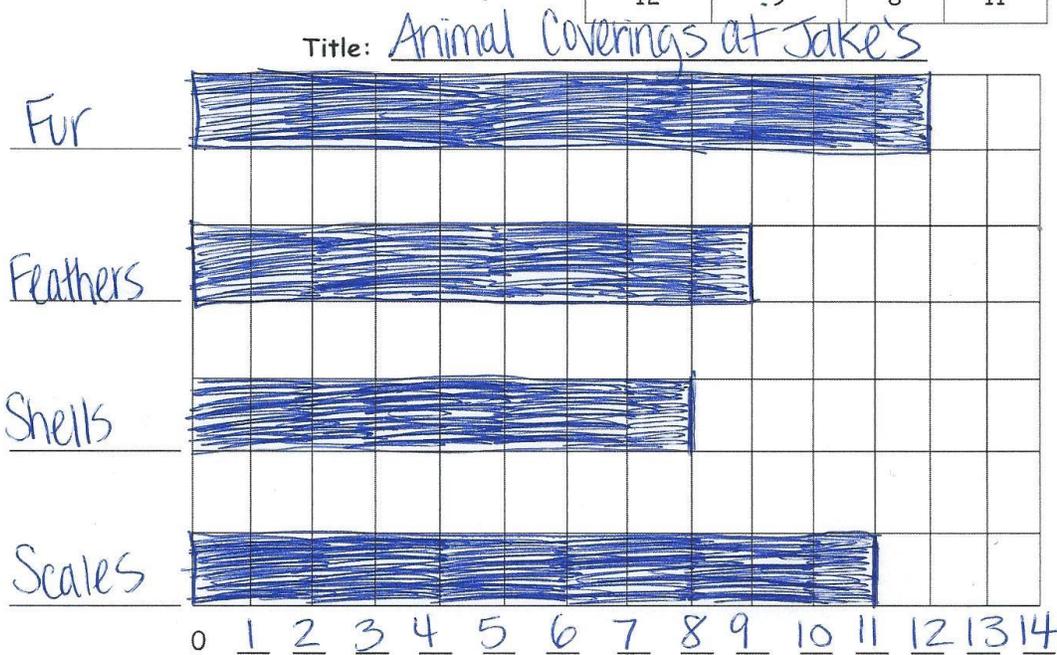
Homework Key

- Correctly completed bar graph with title, bars, categories, and number scale
 - 4
 - Fur and feathers; 2 more
 - Answers will vary.
- Correctly completed bar graph with title, bars, categories, and number scale
 - 31
 - 6
 - 22
 - Answers will vary.

Homework Sample

- Complete the bar graph below using data provided in the table. Then, answer the questions about the data.

Various Animal Coverings at Jake's Pet Shop			
Fur	Feathers	Shells	Scales
12	9	8	11



- How many more animals have fur than shells? 4
- Which pair of categories has more, fur and feathers or shells and scales? (Circle one.) How much more? 2

$\text{fur \& feathers} = 12 + 9 = 21$
 $\text{shells \& scales} = 8 + 11 = 19$
- Write and answer your own comparison question based on the data.

Question: Which has fewer, fur or scales?

Answer: Scales has fewer than fur.

Lesson 4

Objective: Draw a bar graph to represent a given data set.

Homework Key

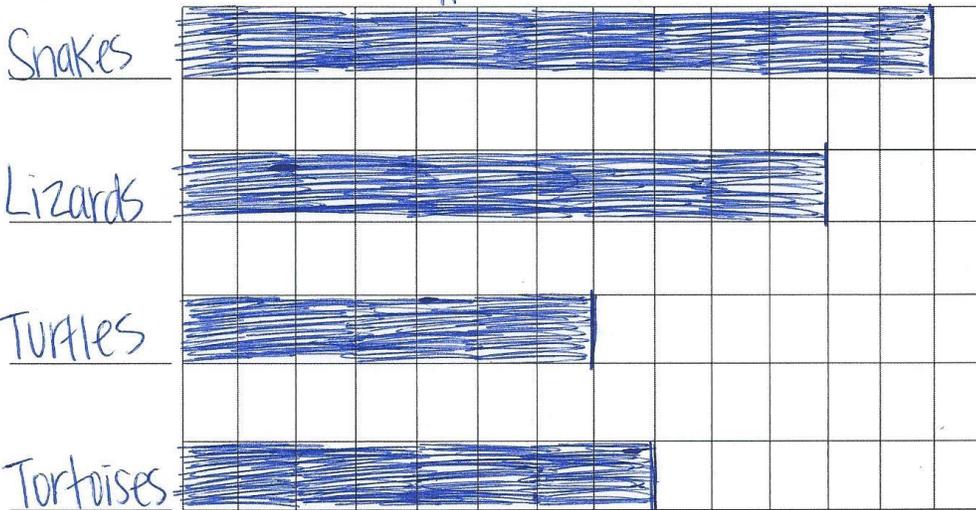
- Correctly completed bar graph with title, categories, bars, and number scale
 - 39
 - 17
 - 9
 - Answers will vary.
- Correctly completed bar graph with title, categories, bars, and number scale
 - 8
 - 4
 - Answers will vary.

Homework Sample

- Complete the bar graph using the table with the types of reptiles at the local zoo. Then, answer the following questions.

Types of Reptiles			
Snakes	Lizards	Turtles	Tortoises
13	11	7	8

Title: Types of Reptiles



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

- How many reptiles are at the zoo? 39
 $13+11+7+8=39$
 $20+11+8=39$
- How many more snakes and lizards than turtles are at the zoo? 17
 $13+11=24$
 $24-7=17$
- How many fewer turtles and tortoises than snakes and lizards are at the zoo? 9
 $7+8=15$
 $13+11=24$
- Write a comparison question that can be answered using the data on the bar graph.
How many more Snakes and lizards than turtles?

Lesson 5

Objective: Solve word problems using data presented in a bar graph.

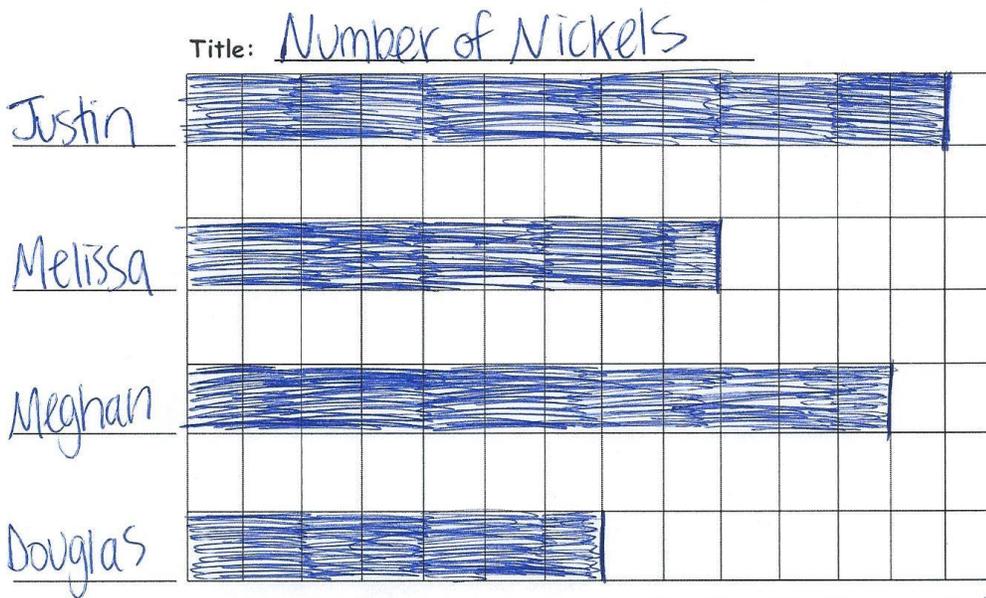
Homework Key

- Correctly completed bar graph with title, categories, bars, and number scale
 - 3
 - 6
 - Justin and Melissa are circled; 3
 - 41
- Correctly completed bar graph with title, categories, bars, and number scale
 - 13
 - 16
 - 15
 - 50

Homework Sample

1. Use the table to complete the bar graph. Then, answer the following questions.

Number of Nickels			
Justin	Melissa	Meghan	Douglas
13	9	12	7



- 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
- How many more nickels does Meghan have than Melissa? 3 $12 - 9 = 3$
 - How many fewer nickels does Douglas have than Justin? 6 $13 - 7 = 6$
 - Circle the pair that has more nickels, Justin and Melissa or Douglas and Meghan.
How many more? 3 $13 + 9 = 22$ $12 + 7 = 19$
 - What is the total number of nickels if all the students combine all their money?
There are 41 nickels altogether.
 $13 + 9 + 12 + 7 = (13 + 7) + 9 + 12$
 $20 + 9 + 12$
 $29 + 12 = 41$

Grade 2 Module 7 Topic B

Problem Solving with Coins and Bills

Focus Standards:

- 2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
- 2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

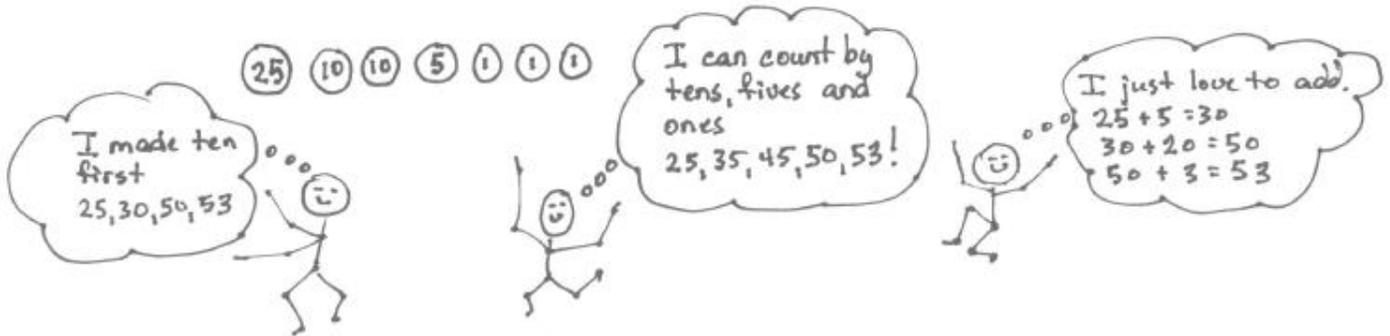
Instructional Days Recommended: 8

In Topic B, students solve problems involving coins and bills. They begin at the concrete level in Lesson 6, using play money to review the different coin values from Grade 1. Beginning with the largest coin value (often the quarter), students count the total value of a group of coins, applying their knowledge of addition strategies (**2.NBT.5**) and skip-counting by fives and tens when there are multiple nickels or dimes.

Lesson 7 builds upon this foundation as students find the total value of a group of coins in the context of simple addition and subtraction word problem types with the result unknown (**2.MD.8**). For example, “Carla has 2 dimes, 1 quarter, 1 nickel, and 3 pennies. How many cents does she have?” Likewise: “Carla has 53¢ and gives a dime to her friend. How many cents does she have left?” To solve the *add to* or *take from with result unknown* word problem types, students might use the RDW process to draw, write the corresponding number sentence, and write a statement with the solution, just as they have been doing throughout the year with word problems in varied contexts.

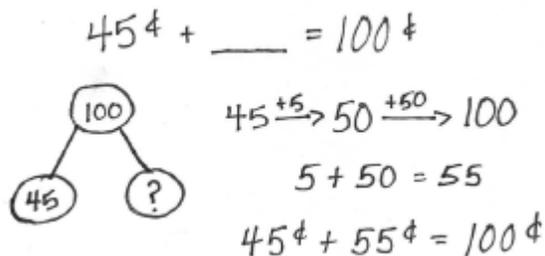
Similarly, in Lesson 8, students apply their understanding of place value strategies and skip-counting to find the total value of a group of bills within \$100, again in the context of addition and subtraction word problems. As in Lesson 6, students arrange bills from greatest to least, count on to find the total, and write a number sentence to represent the total value of the bills, sometimes adding up to four two-digit numbers. They solve problems, such as “Raja has

\$85 in his pocket. Two \$5 bills fall out. How many dollars are in his pocket now?” or “If Raja has 6 one-dollar bills, 4 ten-dollar bills, and 3 five-dollar bills, how many dollars does he have?” Students may write number sentences in any number of ways. One student might skip-count mentally and make a ten, thinking 4 tens make 40 and 3 fives make 15 and then write $40 + 15 + 6 = 40 + 20 + 1 = 61$. Another might correctly write $10 + 10 + 10 + 10 + 5 + 5 + 5 + 6 = 40 + 15 + 6 = 55 + 6 = 61$. Students are encouraged to think flexibly and apply learned solution strategies.



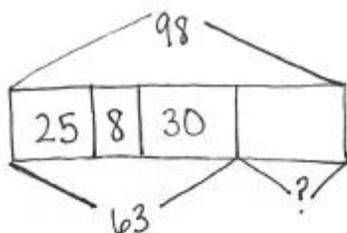
In Lessons 9 and 10, different combinations of coins are manipulated to make the same total value; for example, “Estella has 75¢ to buy a yo-yo. How many different ways could she pay for it?” Seventy-five cents might be recorded with 3 quarters or shown with 2 quarters, 2 dimes, and 5 pennies. Students work cooperatively to explain their reasoning and solution strategies. In Lesson 10, multiple ways are found to represent the same quantity, with the added complexity of using the fewest number of coins (e.g., 67¢ equals 2 quarters, 1 dime, 1 nickel, and 2 pennies). Students see that just as they changed 10 ones for 1 ten in Modules 4 and 5, they can also change coins of a lesser value for coins of a greater value (e.g., 2 nickels = 1 dime).

Students focus on making change from one dollar in Lessons 11 and 12, using the understanding that \$1 has the same value as 100 pennies. In Lesson 11, students learn how to make change from one dollar using counting on, simplifying strategies (e.g., the arrow way), and the relationship between addition and subtraction. They represent the part-whole relationship using a number bond and by writing a number sentence, often using the related addition to solve (e.g., $\$1 - 45¢ = \underline{\hspace{1cm}}$ or $45¢ + \underline{\hspace{1cm}} = 100¢$), as pictured below.



In Lesson 12, students solve one- and two-step word problems involving money. They use the RDW process, first reading the problem and then drawing a picture or model. With a partner, they discuss how their models match the story. Next, students apply a strategy to solve, and then they share their solution strategies with a partner.

In the final lesson of Topic B, students solve two-step addition and subtraction word problems with abstract drawings and equations with the unknown in various positions. For example, “Devon found 98¢ in her piggy bank. She counted 1 quarter, 8 pennies, 3 dimes, and some nickels. How many nickels did she find?” After making a tape diagram, one student’s first step might involve adding the given coins from greatest to least and skip-counting, while another might bond the quarter with 5 pennies to make the next ten before counting on, as pictured on the right. Students synthesize their understanding of place value, making a ten, and skip-counting strategies to solve a variety of problem types embedded within the two-step problems.



$$25 + 8 + 30 = \underline{\quad}$$

$$30 + 3 + 30 = 63$$

$$98 - 63 = 35$$

35¢ is 7 nickels.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 6

Objective: Recognize the value of coins and count up to find their total value.

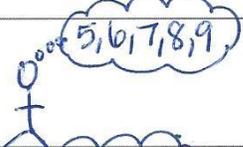
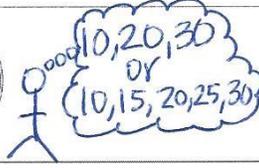
Homework Key

- | | |
|--------|---------|
| 1. 9¢ | 9. 12¢ |
| 2. 13¢ | 10. 37¢ |
| 3. 30¢ | 11. 36¢ |
| 4. 23¢ | 12. 55¢ |
| 5. 27¢ | 13. 61¢ |
| 6. 37¢ | 14. 97¢ |
| 7. 61¢ | 15. 68¢ |
| 8. 17¢ | |

Homework Samples

Count or add to find the total value of each group of coins.

Write the value using the ¢ or \$ symbol.

1.	 	<u>9¢</u>
2.	 	<u>13¢</u>
3.	 	<u>30¢</u>
4.		<u>23¢</u>
5.		<u>27¢</u>
6.		<u>37¢</u>
7.		<u>61¢</u>

Lesson 7

Objective: solve word problems involving the total value of a group of coins.

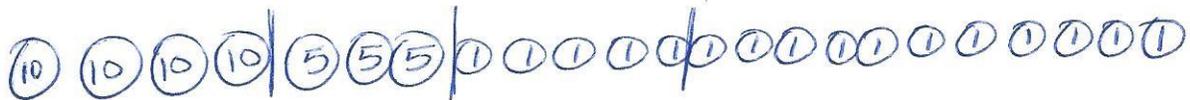
Homework Key

- | | |
|--------|--------|
| 1. 71¢ | 4. 36¢ |
| 2. 73¢ | 5. 87¢ |
| 3. 21¢ | 6. 33¢ |

Homework Sample

Solve.

1. Owen has 4 dimes, 3 nickels, and 16 pennies. How much money does he have?



$$40 \xrightarrow{+15} 55 \xrightarrow{+5} 60 \xrightarrow{+11} 71$$

Owen has 71 cents.

Lesson 8

Objective: Solve word problems involving the total value of a group of bills.

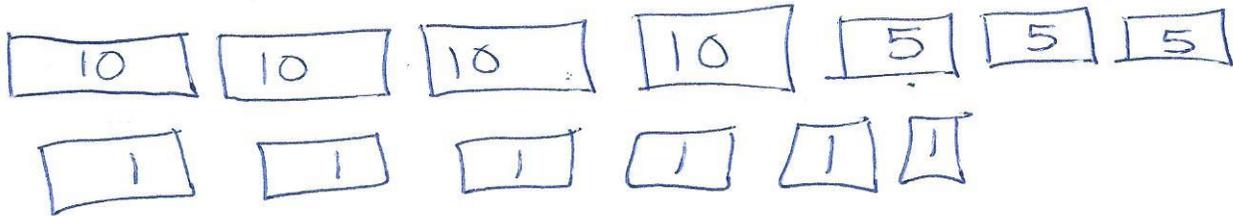
Homework Key

- | | |
|---------|---------|
| 1. \$61 | 4. \$7 |
| 2. \$70 | 5. \$60 |
| 3. \$84 | 6. \$26 |

Homework Sample

Solve.

1. Mr. Chang has 4 ten-dollar bills, 3 five-dollar bills, and 6 one-dollar bills. How much money does he have in all?



$$40 \xrightarrow{+5} 55 \xrightarrow{+5} 60 \xrightarrow{+1} 61$$

Mr. Chang has 61 dollars.

Lesson 9

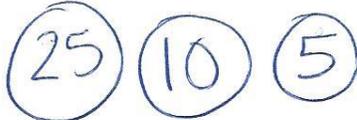
Objective: Solve word problems involving different combinations of coins with the same total value.

Homework Key

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6. Answers will vary, showing combinations that make 69¢.
7. Answers will vary, showing combinations that make \$1.

Homework Samples

Draw coins to show another way to make the same total value.

<p>1. 25 cents</p>  <p>1 dime 3 nickels is 25 cents.</p>	<p>Another way to make 25 cents:</p>  <p>2 dimes and 1 nickel is 25¢.</p>
<p>2. 40 cents</p>  <p>4 dimes make 40 cents.</p>	<p>Another way to make 40 cents:</p>  <p>1 quarter 1 dime 1 nickel is 40¢.</p>

Lesson 10

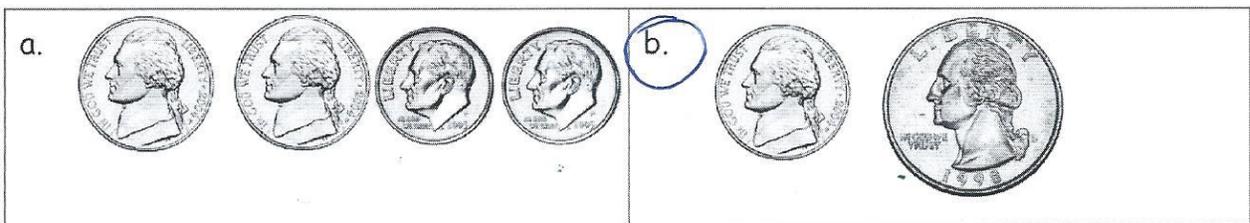
Objective: Use the fewest number of coins to make a given value.

Homework Key

1. (b) circled; 2 dimes and a nickel for a quarter
2. Answers will vary; 1 quarter, 1 dime, and 1 nickel
3. Answers will vary; 2 quarters and 1 nickel
4. Answers will vary; 2 quarters, 1 dime, 1 nickel, and 1 penny
5. Answers will vary; 3 quarters and 1 nickel
6. Answers will vary; 4 quarters
7. 9 dimes, 1 penny is circled; explanations will vary.

Homework Sample

1. Tara showed 30 cents two ways. Circle the way that uses the fewest coins.



What coins from (a) were changed for one coin in (b)?

2 dimes and 1 nickel were changed to 1 quarter.

Lesson 11

Objective: Use different strategies to make \$1 or make change from \$1.

Homework Key

- a. 75¢; 30¢, 70¢
b. 55¢; arrow way answers will vary.
c. 38¢; arrow way answers will vary.
d. 21¢; arrow way answers will vary.
- a. 81¢; arrow way answers will vary.
b. 23¢; arrow way answers will vary.
c. 47¢; arrow way answers will vary.
- a. 62¢
b. 35¢
c. 59¢
d. 73¢
e. 86¢

Homework Sample

- Count up using the arrow way to complete each number sentence. Then, use coins to check your answers, if possible.

a. $25¢ + \underline{75} = 100¢$

$$25 \xrightarrow{+5} 30 \xrightarrow{+70} 100$$
$$\textcircled{25} \textcircled{25} \textcircled{25} = 75$$

c. $62¢ + \underline{38} = 100¢$

$$62 \xrightarrow{+8} 70 \xrightarrow{+30} 100$$
$$\textcircled{10} \textcircled{10} \textcircled{10} \textcircled{5} \textcircled{1} \textcircled{1} \textcircled{1} = 38$$

b. $45¢ + \underline{55} = 100¢$

$$45 \xrightarrow{+5} 50 \xrightarrow{+50} 100$$
$$\textcircled{25} \textcircled{25} \textcircled{5} = 55$$

d. $\underline{21} + 79¢ = 100¢$

$$79 \xrightarrow{+1} 80 \xrightarrow{+20} 100$$
$$\textcircled{10} \textcircled{10} \textcircled{1} = 21$$

Lesson 12

Objective: Solve word problems involving different ways to make change from \$1.

Homework Key

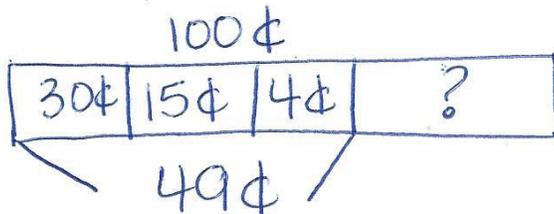
- | | |
|--------|--------|
| 1. 51¢ | 5. 47¢ |
| 2. 55¢ | 6. 62¢ |
| 3. 25¢ | 7. 59¢ |
| 4. 49¢ | |

Homework Sample

Solve using the arrow way, a number bond, or a tape diagram.

1. Kevin had 100 cents. He spent 3 dimes, 3 nickels, and 4 pennies on a balloon.
How much money does he have left?

$$\begin{array}{r} 30 \\ 15 \\ + 4 \\ \hline 49 \end{array}$$



$$49 \xrightarrow{+1} 50 \xrightarrow{+50} 100$$

(25)(25)(1) = 51

Kevin had 51 cents left.

Lesson 13

Objective: Solve two-step word problems involving dollars or cents with totals within \$100 or \$1.

Homework Key

- | | |
|-------------------------|---------|
| 1. 18¢ | 4. \$71 |
| 2. 57¢ | 5. \$45 |
| 3. A quarter and a dime | 6. \$79 |

Homework Sample

1. Kelly bought a pencil sharpener for 47 cents and a pencil for 35 cents. What was her change from \$1?

$$\begin{array}{r} 47 \\ 35 \\ \hline 82 \end{array}$$

\$1	
82¢	?

$$82 \xrightarrow{+8} 90 \xrightarrow{+10} 100$$



Kelly's change was 18 cents.

Grade 2 Module 7 Topic C

Creating an Inch Ruler

Focus Standard:

- 2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

Instructional Days Recommended: 2

Topic C reinforces the measurement concepts and skills learned in Module 2, while focusing on customary units. In Lesson 14, students use an inch tile to measure various objects using iteration. By connecting to prior learning, students deepen their understanding of a length unit, seeing again that, just as it was with the centimeter cube, the length unit is the distance from one end of the tile (or cube) to the other or from one hash mark to the next.

In Lesson 15, students create inch rulers using the same process as they did in Module 2 to create centimeter rulers, using the mark and advance technique with inch tiles to record each length unit with a hash mark. Whereas in Module 2 students made rulers 30 centimeters long and related 100 centimeters to a new unit, the meter (supporting work with the base-ten system), they now relate 12 inches to a new unit, the foot (supporting their work with arrays by recognizing that a new unit can be made with any value). They then use their inch rulers to measure and compare objects around the classroom (**2.MD.1**). Through practice, the foundational concept that the zero point on a ruler is the beginning of the total length and each number on the ruler indicates the number of length units from zero is reinforced.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 14

Objective: Connect measurement with physical units by using iteration with an inch tile to measure.

Homework Key

1. Answers will vary.
2. Answers will vary.
3. 5 inch tiles

Homework Sample

1. Measure these objects found in your home with an inch tile. Record the measurements in the table provided.

Object	Measurement *Answers vary*
Length of a kitchen fork	8 inches
Height of a juice glass	3 inches
Length across the center of a plate	10 inches
Length of the refrigerator	65 inches
Length of a kitchen drawer	20 inches
Height of a can	5 inches
Length of a picture frame	10 inches
Length of a remote control	8 inches

Lesson 15

Objective: Apply concepts to create inch rulers; measure lengths using inch rulers.

Homework Key

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.
4. Answers will vary.
5. Answers will vary.
6.
 - a. 5
 - b. 2
 - c. 3
 - d. 1
 - e. 3
 - f. 2
 - g. 1
 - h. 6

Homework Sample

Measure the length of each household object with your ruler, and then use your ruler to draw a line equal to the length of each object in the space provided.

1. a. A dinner fork is 8 inches.
b. Draw a line that is the same length as the fork.



Grade 2 Module 7 Topic D

Measuring and Estimating Length Using Customary and Metric Units

Focus Standards:

- 2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- 2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
- 2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.
- 2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Instructional Days Recommended: 4

Topic D builds upon the work students completed in Module 2 with centimeter units, as students now explore measurement using both customary and metric units. In Lesson 16, students rotate through various centers and measure a variety of objects with inch rulers and yardsticks, strategically choosing the appropriate measurement tool and units for measuring a given object (**2.MD.1**). By doing so, they develop mental images of customary benchmark lengths.

Next, in Lesson 17, students deepen their measurement sense by applying their experiences in Lesson 16 to estimating the lengths of different objects and then checking their estimates by measuring (**2.MD.3**). For example, a student might estimate that a desk is three feet tall and then measure to discover that it is actually three feet six inches tall.

Then, in Lesson 18, students measure the same objects twice, using both metric and customary units. In this way, they learn that centimeters are smaller than inches. This reinforces the understanding that, when measuring with a smaller unit, more iterations of that unit are needed to measure the same object than when measuring with a larger unit **(2.MD.2)**.

Finally, students compare different lengths using addition and subtraction in Lesson 19. They determine how much longer one object is than another, subtracting the smaller length from the larger one. Problems are solved in a variety of ways using the relationship between addition and subtraction (e.g., $25 \text{ in} - 18 \text{ in} = \underline{\quad} \text{ in}$, or $18 \text{ in} + \underline{\quad} = 25 \text{ in}$), and the differences are expressed using standard length units (e.g., 7 in) **(2.MD.4)**.

The work with measurement tools and various length units in Topic D lays the groundwork for problem solving in Topic E, as students use the more abstract tape diagram to relate addition and subtraction to length.

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math*

Lesson 16

Objective: Measure various objects using inch rulers and yardsticks.

Homework Key

1. Foot; inch; inch; foot; yard; inch
2. a. More than
b. About the same as
c. About the same as
d. Less than
3. Answers will vary.
4. Answers will vary.

Homework Sample

1. Circle the unit that would best measure each object.

Height of a door	inch / <u>foot</u> / yard
Textbook	<u>inch</u> / foot / yard
Pencil	<u>inch</u> / foot / yard
Length of a car	inch / <u>foot</u> / yard
Length of your street	inch / foot / <u>yard</u>
Paint brush	<u>inch</u> / foot / yard

Lesson 17

Objective: Develop estimation strategies by applying prior knowledge of length and using mental benchmarks.

Homework Key

All answers will vary.

Homework Sample

Estimate the length of each item by using a mental benchmark. Then, measure the item using feet, inches, or yards.

Item	Mental Benchmark	Estimation	Actual Length
a. Length of a bed	foot	10 feet	8 feet

Lesson 18

Objective: Measure an object twice using different length units and compare; relate measurement to unit size.

Homework Key

1. 15 cm; 6 in
2. 10 cm; 4 in
3. 8 cm; 3 in
4. 13 cm; 5 in
5. a. Line drawn measuring 5 cm
b. Line drawn measuring 5 in
6. a. Line drawn measuring 7 in
b. Line drawn measuring 7 cm
7. Explanations will vary.
8. Lines drawn measuring 9 cm and 4 in

Homework Sample

Measure the lines in inches and centimeters. Round the measurements to the nearest inch or centimeter.

1. 
- 15 cm 6 in

Lesson 19

Objective: Measure to compare the differences in lengths using inches, feet, and yards.

Homework Key

- 5; 3; 2
- 4; 3; 1
- 3; 3
 - 11; $19 \text{ cm} - 8 \text{ cm} = 11 \text{ cm}$
 - 9; $8 \text{ cm} + 9 \text{ cm} = 17 \text{ cm}$
 - 12; $18 \text{ cm} - 6 \text{ cm} = 12 \text{ cm}$
 - 5; $7 \text{ in} - 2 \text{ in} = 5 \text{ in}$
 - 4; $8 \text{ in} + 4 \text{ in} = 12 \text{ in}$

Homework Sample

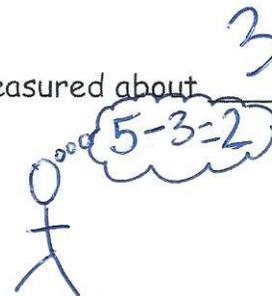
Measure each set of lines in inches, and write the length on the line. Complete the comparison sentence.

1. Line A _____

Line B _____

Line A measured about 5 inches. Line B measured about 3 inches.

Line A is about 2 inches **longer** than Line B.



Grade 2 Module 7 Topic E

Problem Solving with Customary and Metric Units

Focus Standards:

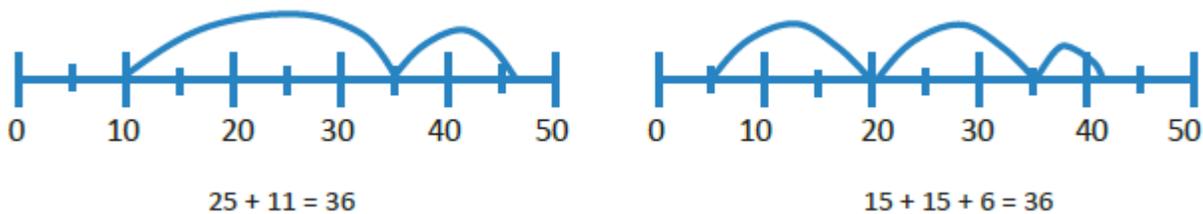
- 2.MD.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
- 2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

Instructional Days Recommended: 3

In Topic E Lesson 20, students use drawings to compare lengths and write equations with an unknown to represent problems, just as they did in Module 2 (**2.MD.5**). In this lesson, however, students solve *two-digit* addition and subtraction measurement problems using customary *or* metric units, composing or decomposing a ten, if necessary. Just as they made comparisons and found differences using bar graphs in Topic A, students now compare lengths using the tape diagram, essentially a horizontal bar, to solve two-step problems. For example, “Frankie has a 54-inch piece of rope and another piece that is 18 inches shorter than the first. What is the total length of both ropes?” Students also solve problems in the context of geometry to find the missing lengths of a rectangle or triangle.

Building upon their understanding of length, students represent whole numbers as lengths on a number line (**2.MD.6**) in Lesson 21. Students identify unknown numbers by using mental benchmarks or reference points (e.g., 5, 10, 25, 50) and intervals of 1, 5, or 10. For example, on a number line with 6 equally spaced segments and endpoints 20 and 50, a student marks the middle segment as 35, realizing that 20 to 35 and 35 to 50 are the same distance, or length. Problems increase in complexity as students use their understanding of place value and the distance between positions to label points. For example, they label 340 as one endpoint when 350 is the midpoint and 360 is the other endpoint.

In Lesson 22, students represent two-digit sums and differences on a number line (**2.MD.6**) and write a number sentence to represent the addition or subtraction situation. For example, they solve the following problems using a number line marked with endpoints 0 and 50, marked intervals of 10 yards, and unmarked intervals of 5. “On a football field, Pepe starts running at the 10-yard line. He runs 25 yards, pauses, and runs 11 more yards. Which yard line is Pepe on now? How far has he run?” In comparison, “Marcel starts running at the 5-yard line. He runs 15 yards, pauses, runs 15 more yards, stumbles, and runs 6 more yards. Which yard line is Marcel on now? How far has he run?” Students show how they solve these problems on the number line with different starting points, and they consider how two different measurement situations can result in the same total and are thus equal to each other (e.g., $25 + 11 = 15 + 15 + 6$), as shown below.



**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 20

Objective: Solve two-digit addition and subtraction word problems involving length by using tape diagrams and writing equations to represent the problem.

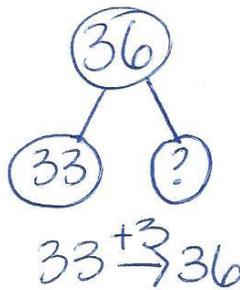
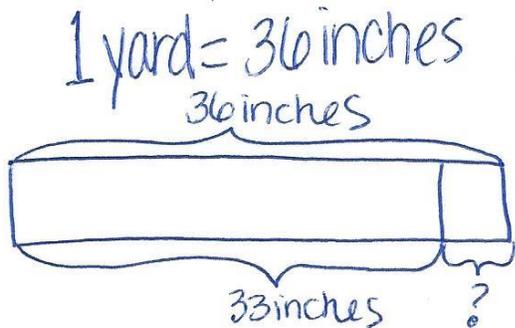
Homework Key

- | | |
|---------------|--------------|
| 1. 3 inches | 4. 24 inches |
| 2. 32 yards | 5. 20 feet |
| 3. 129 inches | 6. 12 yards |

Homework Sample

Solve using tape diagrams. Use a symbol for the unknown.

1. Luann has a piece of ribbon that is 1 yard long. She cuts off 33 inches to tie a gift box. How many inches of ribbon are not used?



Luann didn't use
3 inches of ribbon.

Lesson 21

Objective: Identify unknown numbers on a number line diagram by using the distance between numbers and reference points.

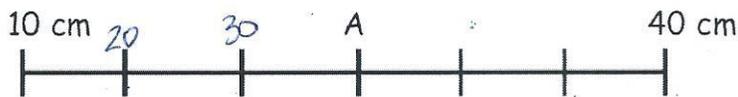
Homework Key

- | | |
|---------------|-----------------|
| 1. 5; 25 cm | 4. 10; 410, 420 |
| 2. 10; 75 cm | 5. 60; 55 |
| 3. 10; 200 cm | 6. 60; 590 |

Homework Sample

Find the value of the point on each part of the meter strip marked by a letter. For each number line, one unit is the distance from one hash mark to the next.

1.



Each unit has a length of 5 cm centimeters.

A = 25 cm



Each unit has a length of 10 centimeters.

B = 75

Lesson 22

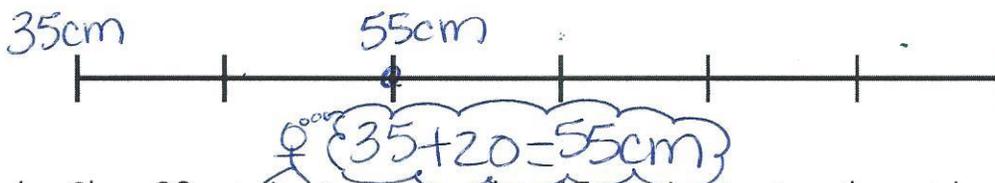
Objective: Represent two-digit sums and differences involving length by using the ruler as a number line.

Homework Key

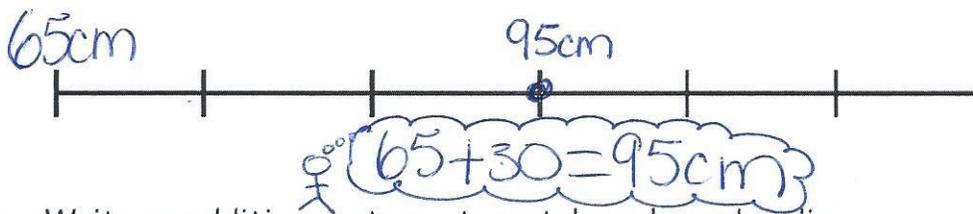
- 35 cm indicated, 55 cm indicated 2 marks to the right
 - 65 cm indicated, 95 cm indicated 3 marks to the right
 - $35 + 20 = 55$ or $20 + 35 = 55$; $65 + 30 = 95$ or $30 + 65 = 95$
- 80 yards indicated, 45 yards indicated 7 marks to the left
 - 100 yards indicated, 75 yards indicated 5 marks to the left
 - $80 - 35 = 45$; $100 - 25 = 75$
- $54 \text{ cm} - 40 \text{ cm} = 14 \text{ cm}$; explanations will vary.
- Answers will vary.
- 119 meter mark

Homework Sample

- Each unit length on both number lines is 10 centimeters.
(Note: Number lines are not drawn to scale.)
 - Show 20 centimeters more than 35 centimeters on the number line.



- Show 30 centimeters more than 65 centimeters on the number line.



- Write an addition sentence to match each number line.

$$35 + 20 = 55 \text{ cm}$$
$$65 + 30 = 95 \text{ cm}$$

Grade 2 Module 7 Topic F

Displaying Measurement Data

Focus Standards:

- 2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
- 2.MD.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

Instructional Days Recommended: 4

Building on the work in Topic E, students now connect the process of measuring to displaying data on line plots. In Lesson 23, students measure their own handspans (i.e., the distance from the tip of the thumb to the tip of the pinky with the hand fully extended), as well as those of five friends, rounding the lengths to the nearest whole inch. They then share the data as a class. Using tally marks, students create a table to record and organize the data.

In Lesson 24, students display the data from the previous day's table on a line plot, where the measurements are shown on a horizontal scale marked off in whole inches (**2.MD.9**). Then, they generate new data by measuring shoe lengths in centimeters. They make a line plot to display the data by using their rulers to mark off whole centimeters. As they create the line plot, students relate their line plot back to the centimeter ruler and the centimeter ruler to a number line.

Finally, in Lessons 25 and 26, students are presented with different data sets, which they represent using line plots (**2.MD.6**). They then discuss the results and learn how to interpret the data. For example, using the table shown below, students create a plot and then answer questions, such as "What was the most common distance reached? What was the least common?" They infer and draw conclusions from the data set and representations, discovering that, while a table is useful for organizing data, a line plot allows for the visual comparisons of the different quantities.

Sit and Reach Distance	Number of Students
22 cm	1
23 cm	1
25 cm	1
26 cm	2
27 cm	3
28 cm	4
29 cm	3
30 cm	3
31 cm	1
34 cm	1

**The sample homework responses contained in this manual are intended to provide insight into the skills expected of students and instructional strategies used in Eureka Math.*

Lesson 23

Objective: Collect and record measurement data in a table; answer questions and summarize the data set.

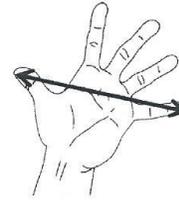
Homework Key

1. Answers will vary.
2. a. Data appropriately recorded on the table:
 Shorter than 4 inches—4 tally marks
 Longer than 4 inches—2 tally marks
 Equal to 4 inches—1 tally mark
- b. 3
- c. 2
- d. Answers will vary.

Homework Sample

Measure your handspan, and record the length here: 7 inches

Then, measure the handspans of your family members, and write the lengths below.



Name:

Daddy
Mommy
brother
Sister

Handspan:

8 inches
7 inches
6 inches
4 inches

1. Record your data using tally marks on the table provided.

Handspan	Tally of Number of People
3 inches	
4 inches	
5 inches	
6 inches	
7 inches	
8 inches	

- a. What is the most common handspan length? 7 inches
- b. What is the least common handspan length? ~~3~~ 5 inches
- c. Ask and answer one comparison question that can be answered using the data above.

Question:

How many more inches was Mommy's handspan than sisters?

Answer:

7 - 4 = 3 inches.

Lesson 24

Objective: Draw a line plot to represent the measurement data; relate the measurement scale to the number line.

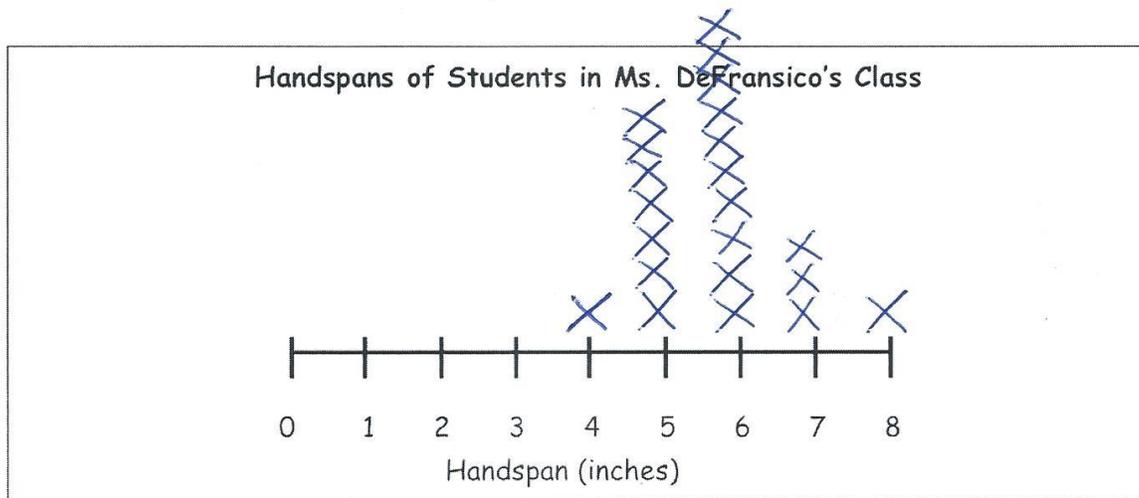
Homework Key

1. Line plot appropriately created using data in the table
Answers will vary.
2. Line plot appropriately created using data in the table
 - a. Answers will vary.
 - b. 9
 - c. 7
 - d. Questions will vary.

Homework Sample

1. Use the data in the table to create a line plot and answer the question.

Handspan (inches)	Number of Students
2	
3	
4	
5	
6	
7	
8	



Describe the pattern you see in the line plot:

Most people's handspan was 6 inches, 5 inches was the next highest.

Lesson 25 - 26

Objective: Draw a line plot to represent a given data set; answer questions and draw conclusions based on measurement data.

Homework Key (25)

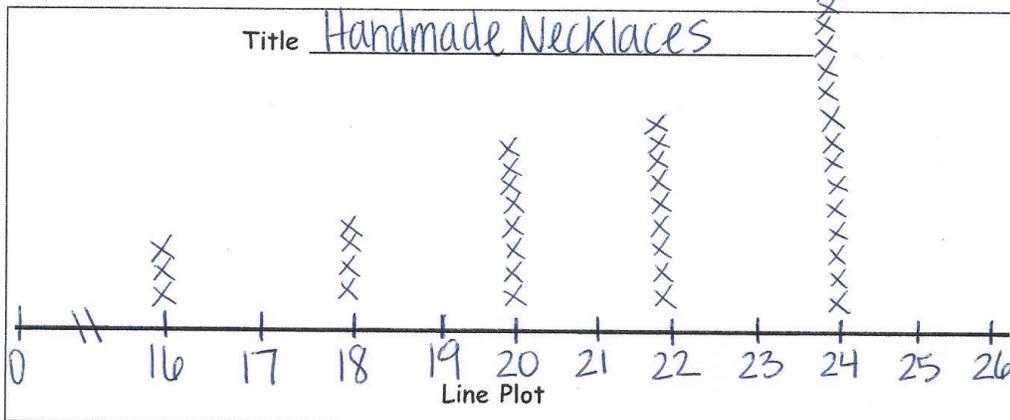
- Line plot appropriately created using data in the chart
 - 40
 - Answers will vary.
- Line plot appropriately created using data in the chart
 - 18
 - 15 inches
 - Answers will vary.
 - Answers will vary.

Homework Sample

Use the data in the charts provided to create line plots and answer the questions.

- The chart shows the lengths of the necklaces made in arts and crafts class.

Length of Necklaces	Number of Necklaces
16 inches	3
17 inches	0
18 inches	4
19 inches	0
20 inches	8
21 inches	0
22 inches	9
23 inches	0
24 inches	16



a. How many necklaces were made? 40 necklaces

b. Draw a conclusion about the data in the line plot:

24 inches was the most common length of a necklace.
All the lengths were even numbers.

Lesson 26

Homework Key

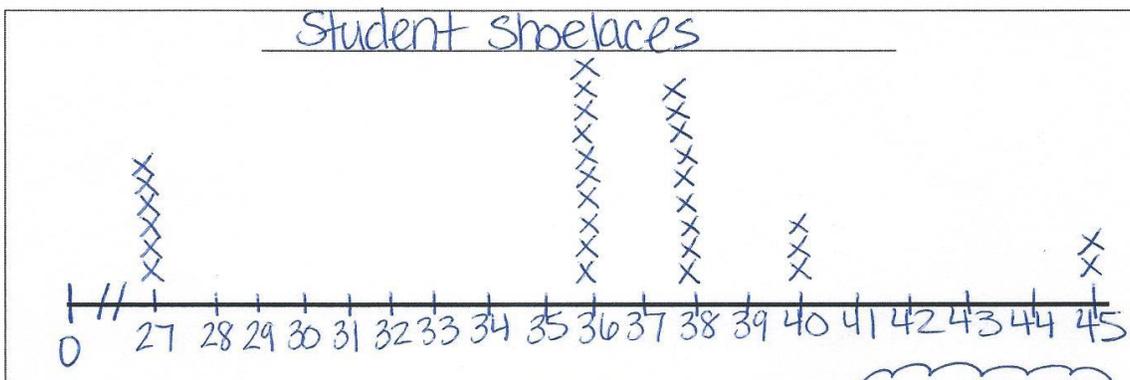
- Line plot appropriately created using data in the table
 - 30
 - 11
 - Answers will vary.
- Table; answers will vary.
- Line plot appropriately created using data in the table
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 - Answers will vary.

Homework Samples

Use the data in the table provided to create a line plot and answer the questions. Plot only the lengths of shoelaces given.

- The table below describes the lengths of student shoelaces in Ms. Henry's class.

Length of Shoelaces (inches)	Number of Shoelaces
27	6
36	10
38	9
40	3
45	2



- How many shoelaces were measured? 30 $6+10+9+3+2$
- How many more shoelaces are 27 or 36 inches than 40 or 45 inches? 11 $(10+6)-(3+2)$
 $16-5$
- Draw a conclusion as to why zero students had a 54-inch shoelace.

That would be a very long shoelace.

- For these data, a line plot / table (circle one) is easier to read because...

the length of shoelaces were spread out.