Topic A

Indirect Comparison in Length Measurement

1.MD.1

Focus Standard: 1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

Instructional Days: 3

Coherence - Links from: GK–M3 Comparison of Length, Weight, Capacity, and Numbers to 10
- Links to: G2–M2 Addition and Subtraction of Length Units
G2–M7 Problem Solving with Length, Money, and Data

The module opens in Topic A by extending students’ kindergarten experiences with direct length measurement to indirect measurement whereby the length of one object is used to compare that of two other objects (1.MD.1).

Students explore direct comparison in Lesson 1, comparing the length of two objects paying close attention to the endpoints of each to ensure accurate comparisons. Students draw on their kindergarten experiences as they use longer than and shorter than as they compare.

In Lesson 2, students begin to use indirect comparison (or transitivity) as they compare each item to one consistent item, such as a piece of string or a strip of construction paper of a specific length. Items are then compared to each other through the indirect comparison. For instance, if the crayon is shorter than the paper strip and the pencil is longer than the paper strip, we can say that the crayon is also shorter than the pencil. As a way to prove their conclusions from indirect comparisons, students use direct comparison to verify their claims.

Lesson 3 extends the use of indirect comparison to compare distances between objects that cannot be moved next to each other for direct comparison. Students use the same transitive process to compare short distances within the classroom in order to see what the shortest path to their classroom door is, which is helpful to know for lining up and emergencies. After measuring each path from their desks to the door with the same piece of string, students are able to make statements such as, “Maya’s path is shorter than the string. Bailey’s path is longer than the string. That means Bailey’s path to the door is longer than Maya’s path.”
### A Teaching Sequence Towards Mastery of Indirect Comparison in Length Measurement

**Objective 1:** Compare length directly and consider importance of aligning endpoints.  
(Lesson 1)

**Objective 2:** Compare length using indirect comparison by finding objects *longer than, shorter than,* and *equal in length* to that of a string.  
(Lesson 2)

**Objective 3:** Order three lengths using indirect comparison.  
(Lesson 3)
Lesson 1

Objective: Compare length directly and consider importance of aligning endpoints.

Suggested Lesson Structure

- Fluency Practice (15 minutes)
- Application Problem (5 minutes)
- Concept Development (30 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (15 minutes)

- Speed Writing 1.NBT.1 (2 minutes)
- Tens and Ones 1.NBT.2 (3 minutes)
- Sprint: Subtracting Ones from Teen Numbers 1.OA.6 (10 minutes)

Speed Writing (2 minutes)

Materials: (S) Personal white boards

Note: This review fluency provides students practice with writing numbers while reinforcing place value.

Tell students to write their numbers from 10 to as high as they can in one minute, while they whisper count the Say Ten way. Teachers may also want to instruct students to organize their numbers in a column, so that the patterns in the tens and ones columns become visible.

Tens and Ones (3 minutes)

Materials: (T) 100-bead Rekenrek

Note: This activity addresses the grade level standard requiring students to understand that two-digit numbers represent amounts of tens and ones.

Practice decomposing numbers into tens and ones using the Rekenrek.

T: (Show 16 on the Rekenrek). How many tens do you see?
S: 1.
T: How many ones?
S: 6.
T: Say the number the Say Ten way.
S: Ten 6.
T: Good. 1 ten plus 6 ones is?
S: 16.
T: (Slide over 10 from the next row.) How many tens to you see?
S: 2.
T: How many ones?
S: 6.
T: Say the number the Say Ten way.
S: 2 tens 6.
T: Good. 2 tens plus 6 ones is?
S: 26.

Slide over the next row and repeat. Continue with the following suggested sequence within 40: 15, 25, 35; 17, 27, 37; 19, 29, 39.

Sprint: Subtracting Ones from Teen Numbers (10 minutes)

Materials: (S) Subtracting Ones from Teen Numbers Sprint

Note: This Sprint addresses the Grade 1 core fluency objective of adding and subtracting within 20.

Application Problem (5 minutes)

Nigel and Corey each have new pencils that are the same length. Corey uses his pencil so much that he needs to sharpen it several times. Nigel doesn’t use his at all. Nigel and Corey compare pencils. Whose pencil is longer? Draw a picture to show your thinking.

Note: In this Application Problem, student use their prior experiences to consider what happens to a pencil after repeated use, and then use that knowledge to compare a new with a used pencil. Students have the opportunity to draw to show their understanding of length and of the term longer. During the Debrief, students will discuss drawings in light of today’s lesson, making statements such as, “Corey’s pencil is shorter than Nigel’s pencil. Nigel’s pencil is longer than Corey’s pencil.”
Concept Development (30 minutes)

Materials: (T) Folder, new crayon, pencil, dry erase marker, jumbo glue stick, *longer than* and *shorter than* sentence frames  (S) Folders, 5 strips of paper (of varying lengths) per set of partners, various objects around the classroom

Have students sit in a meeting area in a semi-circle. The teacher props up a folder on the floor in front of her.

T: (Place a dry erase marker and a pencil behind the folder, making the marker appear taller than the pencil.) Which of these items, the marker or the pencil, is longer?
S: The marker!
T: How do you know?
S: The marker is taller. → The pencil is shorter.
T: (Call up a student.) Please take away the folder and reveal what's behind the folder.
S: (Takes away the folder.)
T: (Keep the way the marker and the pencil were held.) Now, can you tell which one is longer? Turn and talk to your partner.
S: The marker is longer because the top of it is taller. → The pencil is taller. Look at how much higher up the marker is in the air. → It's hard to tell.
T: (Have both items stand on the floor, side by side.) Now, can you tell which one is longer?
S: Yes! The pencil is longer!
T: (Project the sentence frame with *longer.*) Use this sentence frame to say your answer.
S: The pencil is longer than the marker.
T: (Project the sentence frame with *shorter.*) Which is shorter? Use this sentence frame to say your answer.
S: The marker is shorter than the pencil.
T: Are you sure about your decision?
S: Yes.
T: Turn and talk to your partner about what I did differently to help you be sure that the pencil is longer than the marker.
S: You put both things on the floor. → They started at the same place.
T: So, what do we have to make sure to do when we compare two different objects to see which is longer?
Lesson 1

**NOTES ON MULTIPLE MEANS OF ENGAGEMENT:**

Students may need some extra practice understanding how to compare lengths of different objects accurately. Help them to understand the importance of their endpoint. Offer opportunities for student leadership as “teacher” for those students who understand the concept of an endpoint.

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S: You have to start at the same spot. That’s the fair way to see which is longer.

T: You’re right. We have to pay close attention and make sure we line up the very end of each object, which we call the **endpoint**, so that we can compare which is longer or shorter accurately.

T: Let’s try it again. (Hold up the crayon in one hand in a fist and the jumbo glue stick in the other fist, making the crayon appear longer.) Which is longer? Turn and talk to your partner.

S: The crayon. → No, we can’t tell. We don’t know if they are starting off from the same place.

T: Good thinking! You can’t be sure which is longer because I’m hiding the endpoints. Turn and talk to your partner about how you would arrange these items so we can figure out which is longer accurately.

Students discuss as the teacher circulates to choose a volunteer with the idea of aligning the endpoints.

T: (Call up a student to demonstrate.) What did he do to make sure we can be accurate about which item is longer?

S: He lined up the endpoints!

T: Which is longer, the crayon or the glue stick? Use the sentence frame to say your answer.

S: The glue stick is longer than the crayon.

Allow students to “fool” their friends with varying endpoints. Pass out the paper strips and folders. Partner A will hide behind the folder and select two paper strips. She will hold them up, and Partner B will guess which one is longer. Partner A can then reveal the actual lengths. They should discuss Partner B’s guess, and why it was accurate or inaccurate. After discussion, they can switch roles.

T: Now that we know about endpoints, let’s practice lining things up! Go on a scavenger hunt. Find two items of different lengths, one longer or shorter than the other. You have one minute to bring those items to your table.

Students look around the room to find two items of different lengths.

T: Show how you compare the length of your two items. Then make two statements to your partner using the sentence frames.

T: I saw you making sure to line up your items. Now try this. Flip just one of your items and make it stand upside down. Does this change which item is longer or shorter?

S: (Flip and compare.) No.

T: Why not?

S: Because it doesn’t matter if you have them standing the regular way or upside down, as long as you line up the endpoints.

T: I observed so many students lining up their endpoints by making them stand from the table. Can you show a different way to line up the endpoints?

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Lesson 1: Compare length directly and consider importance of aligning endpoints.

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Lesson 1

**Lesson Objective:** Compare length directly and consider importance of aligning endpoints.

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

For some classes, it may be appropriate to modify the assignment by specifying which problems students should work on first. With this option, let the careful sequencing of the problem set guide your selections so that problems continue to be scaffolded. Balance word problems with other problem types to ensure a range of practice. Assign incomplete problems for homework or at another time during the day.

**Student Debrief (10 minutes)**

- **Lesson Objective:** Compare length directly and consider importance of aligning endpoints.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.
Lesson 1

Compare length directly and consider importance of aligning endpoints.

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- When we compare lengths of different objects, what do we need to do to make sure we are comparing accurately?
- When you compare two objects and see that one of them is longer, can you make an accurate statement about which is shorter without looking? How?
- I saw one student compare the length of two objects by standing both objects on the table instead of standing the objects on the floor. Will the student be able to compare them accurately? Why or why not?
- Look at the bats in Problem 4. Were the endpoints aligned? (No.) Could you still see which bat has the longer wingspan? How?
- Look at the pencils and bones from Problems 6 and 7. Compare a pencil to a bone and talk about how they are longer or shorter than one another and how you know.
- Look at your drawings from today’s Application Problem. Does your drawing show an accurate way to compare the length of these two pencils? If not, re-draw your solution based on what you now know about endpoints.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 2

Objective: Compare length using indirect comparison by finding objects longer than, shorter than, and equal in length to that of a string.

Suggested Lesson Structure

- Fluency Practice (13 minutes)
- Application Problem (5 minutes)
- Concept Development (32 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (13 minutes)

- Happy Counting 1.OA.5, 1.NBT.5 (3 minutes)
- Hide Zero Number Sentences 1.NBT.2, 1.NBT.4 (3 minutes)
- Addition with Cards 1.NBT.6 (7 minutes)

Happy Counting (3 minutes)

Note: In the first two modules, students practice counting by ones, tens, twos, and fives, both the regular way and the Say Ten way. Reviewing these counting patterns within 40 prepares students for Module 4 while strengthening their understanding of place value and their ability to add and subtract.

Choose a counting pattern and range based on your students’ skill level. If they are very proficient up to 40, start at 40 and quickly go up to 80. If they are proficient between 40 and 80, Happy Count between 80 and 120. To really reinforce place value, try alternating between counting the regular way and the Say Ten way.

T:
T/S: ten 9 20 2 tens 1 (pause) 20 ten 9 (pause) 20 2 tens 1 22

Hide Zero Number Sentences (3 minutes)

Materials: (S) Hide Zero cards (from G1–M1–Lesson 38, with additional cards found at the end of this lesson)

Note: This fluency activity strengthens the understanding of place value and prepares students for Module 4.

Show students a number from 10 to 40 with Hide Zero cards (e.g., 15). Students say an addition sentence with 10 as an addend (e.g., 10 + 5 = 15). As students say the sentence, break apart the Hide Zero cards to model the equation. Alternate asking students to say the numbers the Say Ten way and the regular way.
Use the following suggested sequence: 15, 25, 35; 14, 24, 34; 16, 26, 36.

**Addition with Cards (7 minutes)**

Materials: (S) 1 pack of numeral cards 0–10 (from G1–M1–Lesson 36) per pair, counters (if needed)

Note: This review fluency strengthens students’ abilities to add within and across ten.

Students place the deck of cards face down between them. Each partner flips over two cards and adds their cards together. The partner with the greatest total keeps the cards played by both players that round. (E.g., Player A draws 4 and 5, and gives the total, 9. Player B draws 9 and 4, and gives the total, 13. Since 9 < 13, Player B keeps the cards.) If the sums are equal, the cards are set aside and the winner of the next round keeps the cards from both rounds. The player with the most cards at the end of the game wins.

**Application Problem (5 minutes)**

Jordan has 3 stuffed animals: a giraffe, a bear, and a monkey. The giraffe is longer than the monkey. The bear is shorter than the monkey. Sketch the animals from shortest to longest to show how tall each animal is.

Note: This problem directly relates to today’s lesson, providing an opportunity to circulate and uncover a student’s prior understanding and possible misconceptions. Student drawings should demonstrate the proper alignment of endpoints when they are sketching to show the comparison between the animals. Students may use the term taller than instead of longer than in their statement. Reinforce the connection between the two terms, that sometimes we describe length in terms of how tall something is when the length is a type of height, going from the ground straight up towards the sky.

**Concept Development (32 minutes)**

Materials: (T) 2 feet of string, 9-cm long strip of paper, scissors, various classroom objects shorter and longer than the teacher’s foot (e.g., board eraser, piece of 9” × 12” construction paper, 8 ½” × 11” paper on a bulletin board) (S) 1 foot of string, scissors, various classroom objects for measuring length, personal white boards with indirect comparison statements insert (template at the end of this lesson), 9-cm long strips of paper, pipe cleaners, or twist-ties for Problem Set

Have students place their personal white boards at their tables and sit in the meeting area in a semi-circle. Place the string and strip of paper on the floor near the teacher for students to see.

T: I’m looking to see if I can find any items that are longer than or shorter than my foot. Oh, I see it! I really want to compare the length of the paper on the bulletin board to my foot. (Walk over to the bulletin board, hoist up foot to try comparing.) Wow, I really want to compare, but it’s not easy. What should I do? Talk with your partner to come up with a plan for how I can compare the length of my foot to the length of the paper on the bulletin board. (Answers may vary.)
Lesson 2

Compare length using indirect comparison by finding objects longer than, shorter than, and equal in length to that of a string.

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be longer than the eraser!

T: Let’s check. (Bring the eraser to the paper on the bulletin board, line up the endpoints, and compare.) You are correct!

T: (Write on the board: The paper is longer than the eraser.) Great thinking!

T: (Hold up a piece of construction paper.) This piece of construction paper is longer than my foot. The paper from the board was longer than my foot, too. Can I tell which type of paper is longer now that I’ve compared both with my foot? Talk with your partner.

S: (Discuss.) No, you can’t tell. → They are both longer, so you don’t know which one is the longest. → You would have to have something that’s in between the two sizes.

T: That’s right. Both the pieces of paper are longer than my foot, but I cannot tell if the construction paper is longer than the paper on the board.

T: Now it’s your turn. You’ll go on a scavenger hunt to find three items, one that is longer than your foot, one that is shorter than your foot, and lastly, something that is about the same length as your foot. But you won’t be able to use your foot to measure. Instead, I will give you a piece of string to use!

Demonstrate how students can work with their partners to measure and cut their piece of string to match their foot (or shoe). Allow five minutes for students to prepare their string and to look for their items. Have students then return to their seats to fill in their comparison statements on their personal white boards and share their findings with a partner. Have them repeat this process as time allows.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Note: Students will be using a 9-cm long paper strip, pipe cleaner, or twist-tie, instead of a string, to measure each picture in the Problem Set. Explain to the students that the paper strip will be used in the same fashion as the string as a measuring tool. You might want to model measuring the first picture (baseball bat) using the paper strip. Also, as students will be using information from Page 1 to complete Page 2, prepare today’s Problem Set on two separate pieces of paper to avoid having students flip over their paper. Students will need to take a paper strip home to complete the homework.
Lesson Objective: Compare length using indirect comparison by finding objects longer than, shorter than, and equal in length to that of a string.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What did we use to compare the length of different objects? (A string and a paper strip.) How were these tools helpful?
- How were you able to figure out the length of different objects when you didn’t compare them side by side?
- The index card is longer than the string. The sticky note is shorter than the string. Which is longer, the index card or the sticky note?
- The marker is shorter than the string. The string is shorter than the crayon. Which is shorter, the marker or the crayon?
- The folder is longer than the string. The book is longer than the string. Which is longer, the folder or the book? (We can’t tell.) Explain how you know this.
- How was using the paper strip in the Problem Set similar to or different from using the string? How did using the paper strip help you compare the objects in the pictures? Use an example from the Problem Set to explain your thinking.
- Look at the pictures from Page 1. Can we compare the baseball bat and the tube? Why, or why not?
- Look at Problem 2(a). How did you set up your paper strip when you measured the cup compared to the tube? Are you still measuring the length of each object? (Yes. It still tells us how long something is. We can measure length in different directions.)
- In the Application Problem today, we were comparing the length of three stuffed animals, which can also be considered their height. When we measure length from the ground towards the sky, we usually call that the height. Did any of you compare the length of two objects based on their height? Share your example.
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 3

Objective: Order three lengths using indirect comparison.

Suggested Lesson Structure

- Fluency Practice (16 minutes)
- Application Problem (5 minutes)
- Concept Development (29 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (16 minutes)

- Beep Counting 1.NBT.1 (3 minutes)
- Rekenrek Addition and Subtraction 1.OA.6, 1.NBT.5 (3 minutes)
- Sprint: Adding and Subtracting Teen Numbers and Ones 1.OA.6 (10 minutes)

Beep Counting (3 minutes)

Note: This fluency activity strengthens students’ ability to understand number relationships and recognize counting patterns.

Say a series of three or more numbers but replace one of the numbers with the word beep (e.g., 15, 16, beep). When signaled, students say the number that was replaced by the word beep in the sequence. Scaffold number sequences, beginning with easy sequences and moving to more complex ones. Be sure to include forward and backward number sequences and to change the sequential placement of the beep.

Suggested sequence: 15, 16, beep; 25, 26, beep; 35, 36, beep; 12, 11, beep; 22, 21, beep; 32, 31, beep; 8, beep, 10; 18, beep, 20; 38, beep, 40; beep, 9, 8; beep, 19, 18; beep, 29, 28. After practicing beep counting by ones, try beep counting by tens, twos, or fives.

Rekenrek Addition and Subtraction (3 minutes)

Materials: (T) 20-bead or 100-bead Rekenrek

Note: This fluency reviews the grade level standard of addition and subtraction within 20.

T: (Show 14 on the Rekenrek.) Say the number.
S: 14.
T: Say it the Say Ten way.
S: Ten 4.
T: What will my number be if I take out ten?
S: 4.
T: Let’s check. (Take out 10.) Yes!

Follow the paradigm to review the following problem types: adding a ten to some ones (e.g., 4 + 10), subtracting a ten from a teen number (e.g., 16 – 10), adding some ones to a teen number (e.g., 13 + 3), subtracting some ones from a teen number (e.g., 17 – 4).

Sprint: Adding and Subtracting Teen Numbers and Ones (10 minutes)

Materials: (S) Adding and Subtracting Teen Numbers and Ones Sprint

Note: This Sprint addresses the Grade 1 core fluency objective of adding and subtracting within 10 and builds the connection between addition and subtraction within 10 to addition and subtraction with teen numbers.

Application Problem (5 minutes)

Draw a picture to match each of these two sentences:
The book is longer than the index card. The book is shorter than the folder.

Which is longer, the index card or the folder? Write a statement comparing the two objects. Use your drawings to help you answer the question.

Note: This problem applies students’ understanding of indirect comparison from Lesson 2. In today’s lesson, students will continue to work with indirect comparisons, focusing on comparing distances.

Concept Development (29 minutes)

Materials: (T) Masking tape (two colors, if possible), piece of string or yarn approximately 6–10 feet long (depending on dimensions of the classroom—the string should reach from the door to the middle of the classroom), projector, City Blocks grid (S) Personal white boards with City Blocks grid insert

Note: Before math class, choose a spot in the middle of the classroom that diagonally faces the door. From this point, create two paths to the door using different colored masking tape for each path on the floor. One path (the red path) should be shorter (and less circuitous) than the other (the blue path). If the classroom floor has tiles, use their lines to guide the paths. If not, use a string to measure the length of each later in the lesson, or mark the tape with length units in black marker to denote unit lengths without referring to them as such.
Invite students to gather in the meeting area.

T: (Project the City Blocks grid.) Mary and Anne are trying to figure out whose path to the park is longer. Here is a map showing Mary’s path and Anne’s path from their house to the park. How can we figure out which path is longer?

S: Look and see which one seems longer. → Count the boxes from one endpoint to the other. → Measure the paths with a string and compare. → Count each line on the path.

T: Yes! These lines are like city blocks. When you trace from one line to the other line, that’s a city block. So, we can count how many city blocks they need to walk in order to get to the park. We don’t want to count the squares, because we need to trace the path which is made up of lines, not squares.

T: I’m going to trace Mary’s path with my marker so I don’t lose track. Count the city blocks with me.

S/T: 1, 2, 3, .... (Count until the tracing reaches the park.)

T: How many city blocks long is Mary’s path?

S: 11 city blocks long.

T: (Write the number and unit next to Mary’s path.)

T: It’s your turn to count the city blocks on Anne’s path by tracing it with your marker.

S: (Trace each city block and count as the teacher circulates.)

T: How many city blocks long is Anne’s path?

S: Nine city blocks long.

T: (Trace and write the number and unit.) Whose path is longer? Mary’s or Anne’s?

S: Mary’s path.

T: If a new girl, Beth, moves into the neighborhood and walks a longer path to get to the park than Mary, whose path is longer, Beth’s or Anne’s? Turn and talk to your partner about how you know.

S: Beth’s path will be longer than Anne’s because you said Beth’s path is longer than Mary’s, and we figured out that Mary’s path is longer than Anne’s. So, Beth’s path has to be longer than Anne’s.

T: Order the paths from longest to shortest on your personal white board.

S: (Write Beth, Mary, Anne.)

T: Great job comparing the lengths of different paths from the map! Let’s try the same thing in our classroom. I’m trying to figure out a path to the door to line up for recess. Should we be finding the longest path to the door or the shortest path to the door, and why? Talk to your partner.

S: The shortest path, because it will help you get to recess sooner!

T: Good thinking. So, let’s do some comparing with the paths I’ve created in the classroom. What do you notice about these two paths?
S: The red one seems longer. It looks like it’s making a lot of turns. → The blue one seems shorter because I see a lot more of the red color on the floor.

T: How can we check which is shorter or longer precisely?

S: (Replies vary depending on how your room is set up for this component.) Count the lines just like we counted the city blocks. → We can use a string, just like we did to measure yesterday. → Our floor has squares. We can count those lines.

T: Let’s check by counting the tile lines just like we counted the city blocks. (Choose two student volunteers to either step on each line or trace each line as the class counts to figure out the length of each path. Adjust this as necessary according to how your room is set up for the activity.)

T: Which is longer?

S: The blue path.

T: Good job! Do you think there’s a shorter way to get to the door than these two paths? Turn and talk to your partner.

S: Yes. Don’t make any turns. Just go straight to the door!

T: You are right! (Walk over to and stand where the two paths start. Place a string on the starting point and hold it. Choose a student to take the other end of the string and walk straight to the door.) Here’s the straight line for the shortest path you have suggested. (Cut the string that measures this straight path.)

T: How can we make sure this is the shortest path compared to the other?

S: Put the string on the other paths and check.

T: (Have students help hold down the string at every corner as you measure the red path. Stop when the string runs out.)

T: Which path is longer? The straight path or this red path? How can you tell?

S: The red path. It keeps going but the string ran out. → The shortest path is the straight line! If we could just fly over the desks.

T: So, if the red path is longer than the string that measures the straight path, which is longer, the straight path or the blue path? Turn and talk to your partner.

S: The blue path is longer, because the blue path is longer than the red path, and the red path is longer than the straight path.

T: Excellent job on figuring out the shortest path to the door. Now we’ve got the quickest way to line up for recess!

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.
Lesson 3
Lesson Objective: Order three lengths using indirect comparison.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

In addition, this is a great place to show the strategy of marking the line segments as they are counted. This strategy could help students with tracking issues.

You may choose to use any combination of the questions below to lead the discussion.

- Look at the City Blocks grid. Think back to the shortest path we made to the door from the middle of the classroom. Draw the shortest path from Anne’s house to the park. What does the path look like? Explain why this path is the shortest path.
- Can you think of other tools that can help you measure the shortest distance between the middle of the classroom to the door? How does using a string help measure different paths?
- Can you think of an example where the shortest path that you could take to the door would not be a straight line? (One or more desks might be in the way, etc.)
- Explain to your partner how to solve Problem 4.
- Explain to your partner how to solve Problem 6.
- How was solving Problems 3 and 5 similar?
- Look at today’s Application Problem. Order the items from longest to shortest.
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Topic B

Standard Length Units

1.MD.1, 1.MD.2

Focus Standard:

1.MD.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

Instructional Days: 3

Coherence - Links from: GK–M3 Comparison of Length, Weight, Capacity, and Numbers to 10
- Links to: G2–M2 Addition and Subtraction of Length Units
G2–M7 Problem Solving with Length, Money, and Data

Topic B adds a new level of precision to measurement by introducing the idea of a length unit. In Lesson 4, centimeter cubes are laid alongside the length of objects as students learn that the total number of cubes laid end to end with no gaps or overlaps is the length measure of that object. The objects being measured by students include many of the same objects measured in Topic A so that students can add greater precision to their measurements as they specify the number of units equal to the length of the objects being compared. For example, the length of the crayon can now be described not only as shorter than the paper strip, but more precisely as 9 centimeter cubes (1.MD.2).

In Lesson 5, students lay those same centimeter cubes alongside a ruler, recognizing the meaning of the numbers on the ruler as describing the number of centimeter length units up to that number. The centimeter then connects students to their world, as they come to realize that the centimeter unit is used by first grade students in Brazil, by the restaurant owner across the street, and even by their families. Students explore the question, “Why would we use a standard unit to measure?” As the use of rulers to measure is a Grade 2 standard, students in Grade 1 simply rename their centimeter cube as a centimeter, as they continue to use the cubes to measure objects. The progressions document suggests that students engage in standard unit measurement in order to develop a solid understanding of why and how to measure, rather than measuring using a plethora of nonstandard measurement units.¹

¹ See the K–5 Geometric Measurement progression.
The topic closes with Lesson 6, where students measure and compare sets of three items with centimeter cubes, returning to the transitive statements of Topic A but with more sophisticated insights: “The pencil measures 10 centimeters. The crayon measures 6 centimeters. The book measures 20 centimeters. In order from shortest to longest is 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.MD.1). Students finally solve compare with difference unknown word problems, determining how much longer a given object is than another.

A Teaching Sequence Towards Mastery of Standard Length Units

**Objective 1:** Express the length of an object using centimeter cubes as length units to measure with no gaps or overlaps.  
(Lesson 4)

**Objective 2:** Rename and measure with centimeter cubes, using their standard unit name of centimeters.  
(Lesson 5)

**Objective 3:** Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving compare with difference unknown word problems.  
(Lesson 6)
Lesson 4

Objective: Express the length of an object using centimeter cubes as length units to measure with no gaps or overlaps.

Suggested Lesson Structure

- Fluency Practice  (13 minutes)
  - Race and Roll Addition  1.OA.6  (4 minutes)
  - Speed Writing by Twos  1.OA.5  (3 minutes)
  - Subtraction Within 20  1.OA.6  (6 minutes)

- Application Problem  (5 minutes)

- Concept Development  (32 minutes)

- Student Debrief  (10 minutes)

Total Time  (60 minutes)

Fluency Practice  (13 minutes)

- Race and Roll Addition  1.OA.6  (4 minutes)
- Speed Writing by Twos  1.OA.5  (3 minutes)
- Subtraction Within 20  1.OA.6  (6 minutes)

Race and Roll Addition  (4 minutes)

Materials: (S) 1 die per set of partners

Note: This fluency activity reviews the grade level standard of adding within 20.

All students start at 0. Partners take turns rolling a die, then saying a number sentence adding the number rolled to the total. (For example, Partner A rolls 6 and says, “0 + 6 = 6.” Partner B rolls 3 and says, “6 + 3 = 9.”) They continue rapidly rolling and saying number sentences until they get to 20, without going over. Partners stand when they reach 20. (For example, if partners are at 18 and roll 5, they take turns rolling until one of them rolls 2 or both of them roll 1. Then, they both stand.)

Speed Writing by Twos  (3 minutes)

Materials: (S) Personal white boards, timer

Note: This fluency activity provides students practice with writing numbers while reinforcing adding 2.

Time students as they count by twos on their boards from 0 to 40 as fast as they can. Students stand and hold up their boards when they get to 40. If their counting sequence is correct, say, “Erase and count again!” To add excitement to the game, give the class a point each time a student gets to 40 and see how many points the class can earn in two minutes.
Record the points to use as a motivator the next time students speed write by twos.

**Subtraction Within 20 (6 minutes)**

**Materials:** (T) Hide Zero cards  (S) Personal white boards

**Note:** This review fluency helps strengthen students’ understanding of the take from ten and take from the ones subtraction strategies, as well as their ability to recognize appropriate strategies based on problem types.

T: (Show 14 with Hide Zero cards.) How can I take 14 apart to help me subtract?
S: 10 and 4.
T: I want to subtract 2 from 14. Write a number sentence to show whether I should subtract 2 from the 4 or the 10.
S: (Write 4 – 2 = 2.)
T: Why wouldn’t I take from my 10?
S: You don’t need to because you have enough ones.
T: Yes! It’s much easier to just subtract from my ones! Since 4 – 2 = 2, 14 – 2 is what? Write the subtraction sentence.
S: (Write 14 – 2 = 12.)
T: (Replace the 4 Hide Zero card with a 2.) Yes!

Repeat with 14 – 5, eliciting that you need to take from ten because there are not enough ones. Repeat with similar problems.

**Application Problem (5 minutes)**

Joe ran a string from his room to his sister’s room to measure the distance between them. When he tried to use the same string to measure the distance from his room to his brother’s room, the string didn’t reach! Which room was closer to Joe’s room, his sister’s or his brother’s?

**Note:** This problem directly applies students’ learning from Lesson 3, as students use indirect comparison to compare distances. For many students, such problems can be challenging to visualize on the first read. After reading, encourage students to draw a picture to show each part before answering the question. Reread the problem, pausing long enough for students to draw a picture of the comparison of the string and Joe’s sister’s room before moving on to read the next sentence. Pictures may vary in many ways. As long as the picture demonstrates that Joe’s sister’s room is closer than Joe’s brother’s room, any formation can provide an appropriate representation.

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Concept Development (32 minutes)

Materials: (T) Projector, new crayon (9 cm), unsharpened pencil (19 cm), dry erase marker (12 cm), centimeter cubes (S) Bag with 20 centimeter cubes; bag with a new crayon, unsharpened pencil, small glue stick, dry erase marker, jumbo popsicle stick (15 cm), and small paper clip (3 cm); recording sheet

Note: Student bags will contain items that will be used throughout Topic B, although not all items in the bag will be used during today’s lesson. Please collect the bags at the end of the lesson and keep them in a safe place for future use. Also, collect the bag with centimeter cubes. These will be sent home each day for use during homework for Lessons 4, 5, and 6.

Have students sit at the meeting area in a semi-circle.

T: (Hold up a new crayon.) How can we find out the length of this crayon? Turn and talk to your partner.

S: Use a string. → Use a ruler.

T: (Project centimeter cubes lined up in a column.) Let’s find out how long this crayon is using these centimeter cubes. What do you notice about the centimeter cubes?

S: They are all exactly the same size. → They have the same length.

T: Since they have the same length, we can figure out how many centimeter cubes long this crayon is. Count with me as I lay down each centimeter cube to match the crayon. (Lay out the first centimeter cube without aligning it to the crayon’s endpoint.)

T/S: 1 centimeter cube.

T: Am I off to a good start?

S: No! You have to line up the endpoints. The edge of the centimeter cube is not starting at the same place as the end of the crayon.

T: You are right! Who can come and start us off on the right foot?

S: (Aligns endpoints.) 1 centimeter cube!

T: Now that our endpoints line up, I can continue to see how many centimeter cubes long this crayon is. (Lay down 3 more centimeter cubes correctly.)

T/S: 2 centimeter cubes! 3 centimeter cubes! 4 centimeter cubes!

T: (Partly overlap the rest of the centimeter cubes by creating an uneven, almost stacked look as pictured to the right.)

T/S: 5 centimeter cubes, 6 centimeter cubes, …11 centimeter cubes!

T: Great. The end of this eleventh centimeter cube lines up with the end of the crayon. So, the crayon is as long as 11 centimeter cubes. Do you agree? Turn and talk to your partner.

S: The centimeter cubes were not laid out correctly. Some parts of the centimeter cubes are under others. Some of them overlap!
T: You are right. That is not an accurate way to measure this crayon. Let me fix it. (Fix some but leave a gap between two centimeter cubes.) Okay, so there are no overlaps. Is this correct?

S: No, there’s a space between the centimeter cubes. That’s not an accurate way to measure. We can’t have any spaces between the centimeter cubes.

T: You are right! The crayon isn’t broken with a space in the middle, so the centimeter cubes have to be all connected, without overlaps or gaps. Who would like to come up and fix the centimeter cubes? (Choose a student.)

S: (Lays out 9 centimeter cubes correctly.)

T: Are the centimeter cubes laid out correctly? Are we ready to count and find out how many centimeter cubes long this crayon is?

S: Yes! (Count as teacher points to each centimeter cube.) 1 centimeter cube, 2 centimeter cubes, ... 9 centimeter cubes!

T: How many centimeter cubes long is the crayon?

S: 9 centimeter cubes long!

T: Every centimeter cube is exactly the same length, so we can use them as length units. Let’s try measuring the pencil with our length units. (Hold up the pencil and the crayon.) What is our length unit called?

S: A centimeter cube.

T: Compared to the crayon, do you think it will take more or fewer of these length units to measure the pencil? Turn and talk to your partner.

S: The colored pencil will need more centimeter cubes because it is longer than the crayon.

Distribute the bags of measuring materials and recording sheets and have students practice measuring and recording the length of each object from the bag. Students work with their partners as they check each other’s work for accuracy. Circulate to provide support for struggling students. If time allows, choose other objects to measure. Long objects can be measured by combining their centimeter cubes.

Note: Use the term about to describe the length of an object that is not exactly a certain number of centimeter cubes long. For example, if the colored pencil is closer to 4 centimeter cubes long than 5, say it is about 4 centimeter cubes long.
Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

For this Problem Set, all objects will be measured horizontally unless otherwise noted by a vertical line next to the object.

Student Debrief (10 minutes)

Lesson Objective: Express the length of an object using centimeter cubes as length units to measure with no gaps or overlaps.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- A length unit is what we use to measure how long something is. When we measure we have to be careful that all of the length units we’re using are the same size. What length unit did we measure with today? (Centimeter cubes.)
- How is measuring with our new length unit different than measuring with a string, as we did yesterday?
- What are the ways in which we need to use the centimeter cubes to accurately measure the length of an object. (Align endpoint, with no gaps or overlaps.) Explain why these are important.
- Look at Problem 10. What mistake might someone make in this question? (They might measure the flower and the vase together.)
- Look at Problem 11. How would you fix the example showing the incorrect way of measuring? Use your own centimeter cubes to correct the length of the smaller bat.
- Can you use the word tall to describe the length of an object? Which objects in the Problem Set could be described as being a certain number of centimeter cubes tall?
- Look at your Application Problem. What was Joe using as his tool to compare length? Use your hands to show me the length you imagined for his string. Explain your thinking.

Be sure to send the bag of cubes home for students to complete their homework.
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 5

Objective: Rename and measure with centimeter cubes, using their standard unit name of centimeters.

Suggested Lesson Structure

- Fluency Practice (17 minutes)
- Application Problem (5 minutes)
- Concept Development (28 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (17 minutes)

- Race and Roll Subtraction 1.OA.6 (4 minutes)
- Happy Counting 1.OA.5, 1.NBT.5 (3 minutes)
- Sprint: Subtraction Within 20 1.OA.6 (10 minutes)

Race and Roll Subtraction (4 minutes)

Materials: (S) 1 die per set of partners

Note: This fluency activity reviews the grade level standard of subtracting within 20.

All students start at 20. Partners take turns rolling the die and saying a number sentence to subtract the number rolled from the total. (For example, Partner A rolls 3 and says, “20 – 3 = 17.” Partner B rolls 2 and says, “17 – 2 = 15.”) They continue rapidly rolling and saying number sentences until they reach 0. If they roll a number greater than the number they are subtracting from (minuend), they re-roll or forfeit their turn. Partners stand when they reach 0. (For example, if partners are at 1 and roll 4, they would take turns rolling until one of them rolls a 1. They would then say, “1 – 1 = 0,” and both partners would stand.) Repeat the game as time permits.

Happy Counting (3 minutes)

Note: Practice with counting forward and backward by tens and ones strengthens students’ understanding of place value. Counting by twos and fives builds students’ ability to count on or back and strengthens addition and subtraction skills.

Repeat the Happy Counting activity from G1–M3–Lesson 2. Choose a counting pattern and range based on your students’ skill level. If they are very proficient with counting by ones, twos, fives, and tens up to 40, start at 40 and quickly go up to 80. If they are proficient between 40 and 80, Happy Count between 80 and 120.
To really reinforce place value, try alternating between counting the regular way and the Say Ten way.

**Sprint: Subtraction Within 20 (10 minutes)**

Materials: (S) Subtraction Within 20 Sprint

Note: This Sprint addresses the Grade 1 standard of subtracting within 20.

**Application Problem (5 minutes)**

Amy used centimeter cubes to measure the length of her book. She used 8 yellow centimeter cubes and 4 red centimeter cubes. How many centimeter cubes long was her book?

Remind students to use the RDW process. After reading (or listening to) the problem, they must be sure to draw, write a number sentence, and write a statement that answers the question.

Note: This problem uses the context of measurement while enabling students to review their processes for adding single digits whose sum is a teen number. Take note of the strategies students are using independently. Are they making ten first? Are they counting on? Are they counting all after drawing the picture? During the Debrief, students will have the opportunity to connect, or rename, the unit length of centimeter cube to the more common unit length of centimeter.

**Concept Development (28 minutes)**

Materials: (T) Projector, centimeter cubes, string, scissors, centimeter ruler (S) Per pair: bag with at least 12 centimeter cubes (from G1-M3-Lesson 4), centimeter ruler, pair of dice

Have student sit in the meeting area in a semi-circle.

T: Will you help me solve a problem? My mom is travelling to different countries, and she wants to get me a bracelet from Korea, Brazil, and France. The problem is, she wants to make sure they fit, but the bracelets are over there and my wrist is here! What can she do? Is there any way we can help her? Talk to your partner.

S: We could measure your wrist with centimeter cubes! → That seems hard though, her wrist isn’t straight. → We could measure your wrist with a string then!

T: I love all of your ideas about the different tools we can use. I knew I could rely on you for some great problem solving! Which will be easier to use first, the string or the centimeter cubes?

S: The string, because it can wrap around your wrist.

T: (Wrap a string around a wrist.) I’ll pretend that the string is the bracelet. I’m going to leave a little room so it’s not so tight. (Cut.)

T: (Project the string on the board.) How can we figure out how long this string is? Turn and talk to your partner about how we can measure accurately.
Lesson 5

Rename and measure with centimeter cubes, using their standard unit name of centimeters.

Date: 7/30/13

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Lesson 5: Rename and measure with centimeter cubes, using their standard unit name of centimeters.

Date: 7/30/13

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Students with disabilities may need some assistance lining up and measuring with centimeter cubes. Model how to use them one on one and then help with a few measurements.

Mom about buying the right length bracelet?

S: Yes! Tell her to buy bracelets that are 18 centimeters long! She can use the ruler to measure 18 centimeters.

T: Thank you for helping me solve this problem! I will write to her and let her know! From now on, when we measure we can say that the length of the item is “___ centimeters” instead of saying “___ centimeter cubes.” Now, you get to see for sure if 1 centimeter cube is 1 centimeter long, 3 centimeter cubes are 3 centimeters long, and 6 centimeter cubes are...

S: 6 centimeters long.

Distribute a bag to each pair of students. Have students practice laying down their centimeter cubes alongside the centimeter ruler and renaming centimeter cubes to centimeters by following these steps:

1. Roll the dice (e.g., 2 and 5).
2. Partner 1 lays down the centimeter cubes alongside the ruler to show the number from the first die (gets to 2 centimeters on the ruler by laying down 2 centimeter cubes). He says, “I measured to 2 centimeters.”
3. Partner 2 adds more centimeter cubes alongside the ruler based on the second die (gets to 7 centimeters on the ruler by laying down 5 centimeter cubes). She says, “Now, we measured to 7 centimeters.”
4. Say the addition sentence that tells how long your row of cubes is. (2 cm + 5 cm = 7 cm.)

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Note: If time permits, provide an opportunity for students to measure their own bracelet or watch size. Students loop string around their wrist, cut it, and use centimeter cubes to determine the length. An ELA connection could include having students write home to their families about the size of their wrists, just as the teacher communicated with his family.
Lesson 5

Student Debrief (10 minutes)

Lesson Objective: Rename and measure with centimeter cubes, using their standard unit name of centimeters.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What is the new length unit we used to measure length accurately? (Centimeters.)
- How can you prove to another first grader that 1 centimeter cube is the same as 1 centimeter?
- How are centimeter cubes similar and different compared to the centimeters on a centimeter ruler?
- Do you think centimeter rulers in Asia or Europe, or anywhere else, look the same as centimeter rulers here?
- Why do you think people all over the world use centimeters as a length unit? Why is it important that we all use the same length unit, like centimeters?
- Look at Problem 2. Explain why your measurements are the same or different.
- How did you solve today’s Application Problem? Tell your partner your answer using the new length unit as if we used a ruler to measure the length of Amy’s book.

Be sure to send the bag of cubes home for students to complete their homework.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 6

Objective: Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving *compare with difference unknown* word problems.

Suggested Lesson Structure

- Fluency Practice (13 minutes)
- Application Problem (5 minutes)
- Concept Development (32 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (13 minutes)

- Addition with Cards 1.OA.6 (7 minutes)
- Speed Writing by Twos 1.OA.5 (3 minutes)
- Cold Call: Number Sentence Swap 1.OA.4 (3 minutes)

Addition with Cards (7 minutes)

Materials: (S) 1 pack of numeral cards 0─10 per set of partners (from G1─M1─Lesson 36), counters (if needed)

Note: This review fluency strengthens students’ abilities to add within and across ten.

Students place the deck of cards face down between them. Each partner flips over two cards and adds their cards together. The partner with the greatest total keeps the cards played by both players that round. (E.g., Player A draws 4 and 5, and gives the total, 9. Player B draws 9 and 4, and gives the total, 13. Since 9 < 13, Player B keeps the cards.) If the sums are equal, the cards are set aside and the winner of the next round keeps the cards from both rounds. The player with the most cards at the end of the game wins.

Speed Writing by Twos (3 minutes)

Materials: (S) Personal white boards, timer

Note: This fluency activity provides students practice with writing numbers while reinforcing adding 2.

Time students as they count by twos on their boards from 0 to 40 as fast as they can. Students stand and hold up their boards when they get to 40. If their counting sequence is correct, say, “Erase and count again!”
Lesson 6

Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving compare with difference unknown word problems.

Date: 7/30/13

To add excitement to the game, give the class a point each time a student gets to 40 and see how many points the class can earn in two minutes. Record the points and compare the score with the last time students speed wrote by twos. Keep a record of points scored each time this activity is done to help students recognize and celebrate improvement.

Cold Call: Number Sentence Swap (3 minutes)

Note: This fluency activity reviews the grade level standard of understanding subtraction as an unknown addend and prepares students for difference unknown problem types in this lesson.

In Cold Call, the teacher asks a question, pauses to provide thinking time, and then randomly calls on a student or group of students to answer. This game helps motivate all students to mentally solve the problem so they will be ready if they are chosen to answer.

T: 4 + what number = 5? (Pause.) Kira?
S: (Only Kira answers.) 1.
T: Good. So, 14 + what number = 15? (Pause to provide thinking time.) Marcus?
S: (Only Marcus answers.)

Continue with the following suggested sequence: 5 + □ = 7, 15 + □ = 17, 4 + □ = 8, 14 + □ = 18.

Application Problem (5 minutes)

Julia’s lollipop is 15 centimeters long. She measured the lollipop with 9 red centimeter cubes and some blue centimeter cubes. How many blue centimeter cubes did she use? Remember to use the RDW process.

Note: This problem enables students to continue working with take apart with difference unknown problem types within the context of measurement. During the Debrief, students will compare the length of Julia’s lollipop with another item from the lesson to determine how much longer the lollipop is compared to that item.
Lesson 6

Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving compare with difference unknown word problems.

Date: 7/30/13

Concept Development (32 minutes)

Materials: (T) Projector, unsharpened pencil (19 cm), new crayon (9 cm), small paper clip (3 cm), dry erase marker (12 cm), jumbo popsicle stick (15 cm), new colored pencil (17 cm), centimeter cubes (S) Bag with centimeter cubes, bag with various classroom objects from Lesson 4, personal white board

Gather students in the meeting area.

T: (Project dry erase marker, crayon, and new colored pencil in a disorganized way.) Without measuring, can you order these three objects from shortest to longest?
S: It's hard to tell which is longer or shorter. → They seem too similar. We couldn't tell for sure. → Let's straighten them out and line up the endpoints. → We should use our centimeter cubes to be sure.
T: (Align the endpoints of each object, keeping the order.) Now can you order the objects from shortest to longest? Share your thoughts with your partner.
S: (Discuss.) The objects from shortest to longest are the crayon, the dry erase marker, and the colored pencil.
T: (Adjust the order as stated by students.) Yes, that's correct!
T: What can we do to describe their length more precisely? How can we tell how long each item is?
S: We can measure them!
T: Take these items out of your bag and let's measure each item using centimeter cubes. Write down how long each item is on your personal white board.
S: (Measure items and record lengths.)
T: What is the length of each item?
S: (Share measurements. Record the length next to each object.)
T: (Touch each object while describing its length.) The colored pencil, which is 17 centimeters, is longer than the dry erase marker, which is 12 centimeters. The dry erase marker is longer than the crayon, which is only 9 centimeters. What can you say about the colored pencil compared to the crayon?
S: The colored pencil is longer than the crayon!
T: Look at the measurements under each object in order from shortest to longest. What do you notice? Talk with your partner. (Circulate and listen.)
S: (Discuss.) The numbers get larger. → The measurements are larger.
T: Let's compare the number of cubes we used to measure the marker and the crayon more closely. (Align the two objects' endpoints, and use centimeter cubes to show their length, as shown below.) Remind me, which object is longer?

NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:
When students turn and talk with a partner they are hearing different ways their peers are thinking about measurement. Hearing others talk about measurement more than once will help your English language learner students understand and acquire language around this topic.
Lesson 6

Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving compare with difference unknown word problems.

Date: 7/30/13

S: The marker.
T: How many centimeter cubes did you use to measure the marker?
S: 12 cubes.
T: How many centimeter cubes did you use to measure the crayon?
S: 9 cubes.
T: How many more cubes did you need to use to measure the marker compared to the crayon? If you need to, put your rows of cubes right next to each other, so you can see the extra cubes you used more easily.
S: (Adjust rows of cubes as necessary to compare.) Three more centimeter cubes.
T: How did you know? Talk with your partner about your thinking. Think about the number sentence that would match what you did.
S: I lined them up and counted on the extras. Ninnnne, 10, 11, 12. That’s 3 more cubes. I thought, “9 plus the mystery number gives me 12.” Then from 9, I counted on to get to 12. I took away 9 from 12 and got 3.
T: (Elicit and write number sentence corresponding to each student response.) You are right! Let’s try some more.

Repeat the process with a new pencil, a paper clip, and a popsicle stick. After comparing the length of two rows of cubes for two of the objects and identifying the difference, encourage students to write the number sentences and the number statement on their personal white boards.

Note: Comparing centimeter cubes is a natural opportunity to concretely experience the compare with difference unknown problem type. Lesson 9 will be dedicated to focusing attention to this objective. Make note of the particular challenges students may be facing and use these specific examples to help shape the concept development work during Lesson 9.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.
Student Debrief (10 minutes)

Lesson Objective: Order, measure, and compare the length of objects before and after measuring with centimeter cubes, solving compare with difference unknown word problems.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What did we do to figure out precisely how much longer or shorter one object was than another today?
- Can you think of a time when it would be helpful or important to say that something is longer by an exact amount rather than just saying it is longer or shorter?
- Turn and talk to your partner about how you solved Problem 3. How are your strategies similar and/or different?
- How was solving Problem 5 different from solving Problems 3 and 4? Explain your thinking.
- Look at your Application Problem. How much longer is Julia’s lollipop than the new crayon? Talk with a partner to discuss how you know.

Be sure to send the bag of cubes home for students to complete their homework.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Topic C
Non-Standard and Standard Length Units

1.OA.1, 1.MD.2

Focus Standard: 1.OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (See Glossary, Table 1.)

1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

Instructional Days: 3

Coherence -Links from: GK–M3 Comparison of Length, Weight, Capacity, and Numbers to 10
-Links to: G2–M2 Addition and Subtraction of Length Units
G2–M7 Problem Solving with Length, Money, and Data

Topic C gives students a chance to explore the usefulness of measuring with similar units. The topic opens with Lesson 7, where students measure the same objects from Topic B using two different non-standard length units simultaneously, such as toothpicks and small paper clips (1.MD.2). They then use small paper clips and large paper clips, two non-standard units that happen to be the same object but at different lengths. Each time they measure one object using both units and receive inconsistent measurement results. Students then begin to ask the question, “Why do we measure with same-sized length units?” As they explore why it is so important to use the same-sized length unit, they realize that doing so yields consistent measurement results.

In Lesson 8, students explore what happens when they use a different unit of measurement from that of their classmates. As students measure the same objects with different non-standard length units, they realize that in order to have discussions about the lengths of objects together, they 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, Lesson 9 closes the topic, with students solving compare with difference unknown
problems using centimeters. Students explore and solve problems such as, “How much longer is the pencil than the marker?” (1.OA.1). Revisiting the centimeter here helps students recognize the value of having a consistent way to communicate about various measurements.

### A Teaching Sequence Towards Mastery of Non-Standard and Standard Length Units

**Objective 1:** Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit. (Lesson 7)

**Objective 2:** Understand the need to use the same units when comparing measurements with others. (Lesson 8)

**Objective 3:** Answer compare with difference unknown problems about lengths of two different objects measured in centimeters. (Lesson 9)
Lesson 7

Objective: Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit.

Suggested Lesson Structure

- Fluency Practice (18 minutes)
- Application Problem (5 minutes)
- Concept Development (27 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

**Fluency Practice (18 minutes)**

- Beep Counting 1.NBT.1 (2 minutes)
- Addition Strategies Review 1.OA.6 (6 minutes)
- Sprint: Addition Within 20 1.OA.6 (10 minutes)

**Beep Counting (2 minutes)**

Note: This fluency activity strengthens students’ ability to understand number relationships and recognize counting patterns. If students are proficient with beep counting by ones, consider beep counting by tens (1.NBT.5), or challenge students with practicing Grade 2 standards of counting by twos or fives (2.NBT.2).

Say a series of three or more numbers but replace one of the numbers with the word beep (e.g., 15, 16, beep). When signaled, students say the number that was replaced by the word beep in the sequence. Scaffold number sequences, beginning with easy sequences and moving to more complex ones. Be sure to include forward and backward number sequences and to change the sequential placement of the beep.

Suggested sequence: 15, 16, beep; 25, 26, beep; 35, 36, beep; 12, 11, beep; 22, 21, beep; 32, 31, beep; 8, beep, 10; 18, beep, 20; 38, beep, 40; beep, 9, 8; beep, 19, 18; beep, 29, 28; etc.
Addition Strategies Review (6 minutes)

Materials: (T) Hide Zero cards

Note: This review fluency helps strengthen students’ understanding of the make ten and add the ones addition strategies, as well as their ability to recognize appropriate strategies based on the number of tens and ones in both addends.

Divide students into partners. Lay out your Hide Zero cards so they are easy to access. Show 9 and 6 with your cards.

T: Partner A, show me 9 on your Magic Counting Sticks. Partner B, show me 6. If I want to solve 9 + 6, how can I make a ten?

S: Take one from the 6 and add 1 to 9.

T: Yes. Show me! (Exchange the 9 and 6 cards for 10 and 5 as students adjust their fingers.) We changed 9 + 6 into an easier problem. Say our new addition sentence with the solution.

S: 10 + 5 = 15.

T: (Put the Hide Zero cards together to show 15.) Say it the Say Ten way.

S: Ten 5.

T: (Show 13 with Hide Zero cards.) Partner A, show the ones. Partner B, show the tens. (Break apart the Hide Zero cards as students hold up their fingers.) If we want to add 2, should we make a ten to help us?

S: No. We already have a ten!

T: Should we add 2 to our 3 or our 10?

S: Our 3.

T: Yes! Partner A, show me 3 + 2. (Exchange the 3 card for a 5 card.) What is the answer?

S: 5.

T: So, Partner B, what is 13 + 2?

S: 15.

T: Say it the Say Ten way.

S: Ten 5.

Sprint: Addition Within 20 (10 minutes)

Materials: (S) Addition Within 20 Sprint

Note: This Sprint addresses the Grade 1 standard of adding and subtracting within 20.
Application Problem (5 minutes)

When Corey measures his new pencil, he uses 19 centimeter cubes. After he sharpens it, he needs 4 fewer centimeter cubes. How long is Corey’s pencil after he sharpens it? Use centimeter cubes to solve the problem. Write a number sentence and a statement to answer the question.

Note: As students build measurements with centimeter cubes, they continue to connect their experiences of addition and subtraction with concrete problem situations. As students work, encourage them to talk through the problem sentence by sentence, placing the centimeter cubes in front of them to build the story.

During the Debrief, connect the students’ concrete experience with the problem type or computation.

Concept Development (27 minutes)

Materials: (T) Chart paper, 3 new pencils of different color (e.g., red, blue, yellow) from the same brand and size, mixed set of large and small paper clips (S) Bag of 20 large paper clips and 20 small paper clips

Note: Model for students how to measure objects that are longer or shorter than a whole unit. Also, discuss how best to choose the number of units when estimating.

Gather students in the meeting area with their materials.

T: For the past few days, we have been measuring with centimeter cubes. Today, let’s measure with paper clips. What did we learn about the rules of measuring? (Write the rules on chart paper as students respond. Model how to measure objects that are longer or shorter than a whole unit. Discuss how best to choose the number of units when estimating.)

S: Line up the endpoints. → Don’t leave any gaps. → Don’t overlap what you are measuring with.

T: Let’s see how long this red pencil is by using paper clips as our length unit. (Measure with a mix of both paper clips, e.g., 3 large and 1 small.) How many paper clips long is the red pencil?

S: 4 paper clips long.

T: (Keep the red pencil measurement displayed.) This blue pencil is the same length. Let’s measure it using paper clips as the length unit. (Measure with a different combination of paper clips, e.g., 1 large and 4 small.) How many paper clips long is the blue pencil?
Lesson 7: Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit.

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S: 5 paper clips long.
T: According to these measurements, the blue pencil is longer than the red. Is this correct?
S: Yes. But, it looks like the pencils are the same length!
T: Let’s compare the pencils directly. (Pick up the pencils from their places and stand them up from the floor. Leave the paper clip measurements where they are.) Are they the same length?
S: Yes!
T: (Put the pencils back so they are aligned with their paper clips.)

T: Hmm. Let me measure again. This yellow pencil is also the same length as the others. (Measure with a different combination of paper clips, e.g., 4 large paperclips.) Oh boy, this time, it’s less than 4 paper clips long! Why do I keep getting different measurements when the pencils are the same size?
T: I’m using the length unit of a paperclip. (Refer to the chart with measuring rules.) I’m aligning my endpoints, making sure there are no gaps or overlaps. I should be getting the same length measurement each time since the pencils are the same length.

T: Talk to your partner. Can you figure out what I need to change about the way I’m measuring?
S: The paper clips are different sizes! Some paper clips are long and others are short! It’s not an accurate measurement because the paper clips have to be the same size, just like our centimeter cubes were the same size, a centimeter. We should only use the smaller paper clips. Or, we should only use the bigger paper clips. But, we can’t mix them.

T: It sounds to me like we have a new rule for proper measuring! (Add to the chart: Length units must be the same length.) Just like you said, we need to make a decision: either use just the small paper clips or...
S: Just the big paper clips!
T: Great. And what should we make sure we don’t do?
S: Mix them up because they are different sizes.
T: (Ask a student volunteer to come up and use small paper clips to measure the red pencil. Measure the blue pencil with small paper clips as the student measures the red pencil.) How many paper clips long is the blue pencil? How many paper clips long is the red pencil?
S: They are both about 6 small paper clips long!
T: Thank you for solving my measurement problem! You’re ready to go and measure with paper clips on your Problem Set. Before you go, let’s read all of our rules for measuring.

While distributing a bag of varying paper clips to each student, remind the class of the new rule, to make sure they use the same length paper clips as they measure. (Note: It will be helpful to students to have the chart hanging in the classroom for future reference.)
Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

Note: Circulate to ensure that students use the correct size of paper clip for each set of questions. The last two items in the chart are found in the classroom, not in the Problem Set.

Student Debrief (10 minutes)

Lesson Objective: Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- What is a new rule we must remember when we are measuring? (Length units must be the same size.)
- Compare your first chart to your partner’s. Explain why you have the same measurements.
- Even though we measured the same objects, why are your measurements different on your first chart from your second chart?
- A student said she used new pencil-top erasers from a pack to measure how long her pencil is. All the erasers are the same size. Her partner said she couldn’t use these erasers to measure properly because they are all different colors. Who is correct?
- Look at your Application Problem. What measurement rules did you have to keep in mind? Did you add more cubes or take cubes away to solve this problem? What number sentence matches the problem?
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Lesson 7:

Measure the same objects from Topic B with different non-standard units simultaneously to see the need to measure with a consistent unit.

Date:

7/30/13
Lesson 8

Objective: Understand the need to use the same units when comparing measurements with others.

Suggested Lesson Structure

- Fluency Practice (10 minutes)
- Application Problem (5 minutes)
- Concept Development (35 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (10 minutes)

- Speed Writing 1.OA.5 (3 minutes)
- Race and Roll Addition 1.OA.6 (4 minutes)
- Cold Call: Addition and Subtraction Within 20 1.OA.6 (3 minutes)

Speed Writing (3 minutes)

Materials: (S) Personal white boards, timer

Note: Throughout the first two modules, students have been practicing counting by ones, twos, fives, and tens, as well as Say Ten counting.

Reviewing these counting patterns prepares students for Module 4 by strengthening their understanding of place value and their ability to add and subtract. Many students are familiar with skip-counting, and though skip-counting by twos, fives, and tens is not a Grade 1 standard, the teacher can incorporate these counting patterns if appropriate.

Choose a counting pattern with which students need more practice. Students count on their boards by the chosen pattern for a minute. Tell them to erase their boards but remember how high they counted. Then, give them another minute to try to count even higher.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

If you have students who are not able to count by the chosen pattern without numerical visual cues at this point in the year, use a tool such as a number line or the hundreds chart. Students can color the pattern on the number line or hundreds chart so that they have a visual representation as they count on their own.
Lesson 8

Understand the need to use the same units when comparing measurements with others.

Date: 7/30/13

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Race and Roll Addition (4 minutes)

Materials: (S) 1 die per set of partners

Note: This fluency activity reviews the grade level standard of adding within 20.

All students start at 0. Partners take turns rolling a die, then saying a number sentence adding the number rolled to the total. (For example, Partner A rolls 6 and says, “0 + 6 = 6.” Partner B rolls 3 and says, “6 + 3 = 9.”) They continue rapidly rolling and saying number sentences until they get to 20, without going over. Partners stand when they reach 20. (For example, if partners are at 18 and roll 5, they take turns rolling until one of them rolls 2 or both of them roll 1. Then, they both stand.)

Cold Call: Addition and Subtraction Within 20 (3 minutes)

Note: This review fluency addresses Grade 1’s standard and practices including units when adding length.

For directions on how to play Cold Call, refer to G1–M3–Lesson 6.

T: 4 centimeters + 2 centimeters is? (Pause to provide thinking time.) Students with pets?
S: (Only students with pets answer.) 6 centimeters.
T: 14 centimeters + 2 centimeters is? (Pause to provide thinking time.) Students with no pets?
S: (Only students with no pets answer.) 16 centimeters.

Continue playing, practicing addition and subtraction within 20. As always, scaffold instruction by beginning with easy problems and slowly increasing the complexity.

Application Problem (5 minutes)

Each crayon is 9 centimeter cubes long. The paintbrush is the same length as 2 crayons. How many centimeter cubes long is the paintbrush? Use centimeter cubes to solve the problem. Write a number sentence and a statement to answer the question.

Note: Students continue to use concrete materials to consider problem situations. Continue to encourage students to build each part of the story, using the cubes to think through what they know and to identify what they do not yet know. During the Debrief, students can demonstrate their strategies for solving the problem. The example above right shows several ways in which students may solve this Application Problem. Some students may simply align the cubes and solve without drawing.
Lesson 8
Lesson 8: Understand the need to use the same units when comparing measurements with others.

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Concept Development (35 minutes)

Materials: (T) Measuring Rules chart (from G1–M3–Lesson7) (S) 1 brown bag of 2 new crayons, 10 linking cubes, and 10 centimeter cubes per pair

Gather the students in the meeting area in a semi-circle.

T: We have measured with many different tools so far. Who can name the different tools we have used to measure?


Review the rules for measuring properly using the chart created in the previous days’ lesson.

T: (Distribute a brown bag with materials listed above to each pair of students.) You and your partner are going to measure the new crayons with the materials in your bag. Don’t forget about the rules for proper measuring!

T: How many cubes long was your new crayon? (Note: Do not tell students which cubes to use.)

S: Mine was 9 cubes long. → Mine was 3 cubes long.

T: That’s interesting. These crayons are brand new, they came from the same box which means they should be the same size. (Match up the crayons.) And they are! Why are we getting different measurements?

Ask students if they measured properly by going over each rule, repeating the last rule twice to ensure that no one mixed the cubes to measure.

T: Why do we have different measurements? Talk with your partner.

S: We were measuring with different cubes. We didn’t mix them up, but I measured with smaller cubes, the centimeter cubes. My partner measured with bigger cubes, the linking cubes. → We didn’t do anything wrong. We measured correctly. It’s just that our answers are different because we used different size cubes from each other.

T: Great thinking! Even though you measured properly, it sounds like we need to add a rule for sharing and communicating about our measurements. When someone says, “My crayon is 3 cubes long,” and another person says, “No! It’s 9 cubes long,” this can become a frustrating conversation because they are both right! So, how can we help these two students?

S: They have to say, “My crayon is 3 linking cubes long,” or, “My crayon is 9 centimeter cubes long.” → We have to say what type of tool we used to measure!

T: Yes! We need to be precise when we communicate about which length unit we used to measure. Let’s practice measuring more items and communicating their measurements precisely on your Problem Set.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Highlight vocabulary that could be unfamiliar for your English language learners as you teach the lesson. Vocabulary in this lesson that you may want to highlight is sharing and communicating. Provide some examples of how students share and communicate outside of math so that they can make the connection.
Give each student, or pair of students, one set of the following measuring tools:

- 20 small paper clips
- 20 large paper clips
- 20 toothpicks
- 20 centimeter cubes

Ask students to measure the classroom objects with their assigned measuring tools. Remind students to write the word about if their measurement is not exactly a certain length unit long. Circulate and ask students about their measurements, encouraging them to use the length unit label as they share. (Note: The use of the word about was first introduced in G1–M3–Lesson 4. Remind students that if they are going to use this word the appropriate way to use it is, “My pretzel rod is about 18 centimeter cubes long.”)

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

For the Problem Set and Homework, each student gets one of the following: bag of 20 small paper clips, bag of 20 large paper clips, bag of 20 toothpicks, bag of 20 centimeter cubes. Be sure to have each student take the bag home to complete the homework assignment.

**Student Debrief (10 minutes)**

**Lesson Objective:** Understand the need to use the same units when comparing measurements with others.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner who used the same length unit before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Compare your measurements to your partner’s (a student who used a different tool). How are your answers different?
- Why do we need a label, or a length unit, along with a number when we are writing our measurements? Why can’t we use the number only?
- How can it be true that when Student A says the glue stick is X paper clips long and Student B says it is Y centimeter cubes long, they are both correct?
Lesson 8

Understanding the need to use the same units when comparing measurements with others.

Date: 7/30/13

- Student A says she used 9 centimeter cubes to measure the crayon. Student B says she used 3 small paper clips to measure the crayon. Why do you think she needed so many more centimeter cubes to measure the crayon compared to using the small paper clips?
- Pick three objects from your sheet. Name your items in order from shortest to longest. Name your items in order from longest to shortest.
- Would the order change if you were using a different measuring tool to measure length? Why or why not?
- Display an example of the Problem Set for Lesson 7. Look at the caterpillar on each page. How do our measurements on each page relate to today’s lesson?
- Look at your Application Problem. How much longer is the paintbrush compared to one crayon? Why is it important that you included the label centimeters or centimeter cubes after the number in your statement?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 9

Objective: Answer compare with difference unknown problems about lengths of two different objects measured in centimeters.

Suggested Lesson Structure

- Fluency Practice: 18 minutes
- Application Problem: 5 minutes
- Concept Development: 27 minutes
- Student Debrief: 10 minutes
- Total Time: 60 minutes

Fluency Practice (18 minutes)

- Race and Roll Addition 1.OA.6 (5 minutes)
- Sprint: Addition Within 20 1.OA.6 (10 minutes)
- Number Sentence Swap 1.OA.4 (3 minutes)

Race and Roll Addition (5 minutes)

Materials: (S) 1 die per set of partners

Note: This fluency activity reviews the grade level standard of adding within 20.

All students start at 0. Partners take turns rolling a die, then saying a number sentence adding the number rolled to the total. (For example, Partner A rolls 6 and says, “0 + 6 = 6.” Partner B rolls 3 and says, “6 + 3 = 9.”) They continue rapidly rolling and saying number sentences until they get to 20, without going over. Partners stand when they reach 20. (For example, if partners are at 18 and roll 5, they take turns rolling until one of them rolls 2 or both of them roll 1. Then, they both stand.)

Sprint: Addition Within 20 (10 minutes)

Materials: (S) Addition Within 20 Sprint

Note: This Sprint addresses the Grade 1 standard of adding and subtracting within 20. It is the same Sprint from two days prior, so students will likely do better today. Along with celebrating improvement between Sides A and B, celebrate improvement from the last time this Sprint was given.
Number Sentence Swap (3 minutes)

Say a subtraction sentence aloud, saying “the mystery number” for the unknown answer (e.g., “5 – 3 = the mystery number”). Call on a student to rephrase the sentence as an addition sentence (e.g., “3 + the mystery number = 5”). Pause to provide thinking time. Students solve for the mystery number on your signal.

Suggested sequence: 5 – 3, 15 – 3, 6 – 4, 6 – 4, 16 – 4, etc.

Application Problem (5 minutes)

Corey buys a super-cool, extra-long crayon that is 14 centimeters long. His regular crayon is 9 centimeters long. Use centimeter cubes to decide how much longer Corey’s new crayon is than his regular crayon.

Write a statement to answer the question. Write a number sentence to show what you did.

Note: This problem continues to provide students with opportunities to concretely build various lengths with centimeter cubes. As students work towards solving compare with difference unknown problem types, experiences with concrete objects like centimeter cubes can strengthen understanding. Students will be exploring the comparison of centimeter cubes during today’s lesson. As students work, notice how they are solving and use your analysis during the Concept Development.

Concept Development (27 minutes)

Materials: (T) 2 different color centimeter cubes (e.g., blue and yellow), dry erase marker, popsicle stick, crayon, glue stick, small paper clip, unsharpened pencil, new colored pencil, measurement chart from G1–M3–Lesson 6 (S) Bag with 20 blue and 20 yellow centimeter cubes, bag with classroom materials from G1–M3–Lesson 4, new colored pencil

Note: Adjust the Concept Development as necessary based on your observations of student successes and challenges during G1–M3–Lesson 6, as well as during the most recent Application Problems. Today’s Concept Development is an opportunity to continue supporting student understanding of the compare with difference unknown problem types within the concrete context of comparing lengths of centimeter cubes. As addressed in the Note on Standards Alignment, the focus of the lesson should be on comparing the cubes themselves rather than the Grade 2 standard of comparing the measurements alone.

Gather students in the meeting area in a semi-circle formation.

T: (Post the measurement chart from G1–M3–Lesson 6.) The teacher next door and I were playing a game. Whoever finds the longer object on our desk would win, but the object could not be longer than a new pencil. For each extra centimeter in length, the person with the longer object would get a point.
Lesson 9: Answer compare with difference unknown problems about lengths of two different objects.

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T: He found a popsicle stick, and I found a dry erase marker, just like the ones on our chart (point to the chart). My dry erase marker measured 12 centimeters and his popsicle stick measured 15 centimeters. He said he gets 15 points, but I don’t think that’s right. Let’s lay the centimeter cubes down and compare them to see how many points he will get in our game.

T: I’ve got 12 centimeter cubes here in my hand. (Lay the two objects in the middle. Point to the chart.) The dry erase marker is 12 centimeters long. Will I have enough cubes to measure my dry erase marker?

S: Yes! It is 12 centimeters long, and you have 12 centimeter cubes.

T: (Lay down blue centimeter cubes next to the dry erase marker. Point to the popsicle stick measurement of 15 centimeters on the chart.) Will these same 12 cubes be enough to measure the popsicle stick?

S: No! There are only 12 centimeter cubes. The popsicle stick is 15 centimeters long.

T: (Lay down 12 blue centimeter cubes next to the popsicle stick.) The teacher next door says he gets 15 points because it took 15 more centimeter cubes to measure the popsicle stick! Look at the marker and the centimeter cubes we laid down. Is he right? Does he need 15 more cubes? Talk with a partner, how many more cubes does he need? (Have partners share their thinking with the class.)

T: Now, let’s try the other teacher’s idea. (Add 15 more cubes, this time using yellow cubes.) Wow, this is too long! It’s much longer than the difference between what he already has and what he needs. What should I do?

S: Take away all of the extra cubes until it lines up with the end of the popsicle stick.

T: (Three yellow cubes are left.) So, if I had 12 cubes and he had 15 cubes, how many more cubes did the teacher need compared to me?

S: 3 more cubes.

T: How much longer is the teacher’s popsicle stick compared to my marker?

S: 3 centimeters.

T: How much shorter is my marker compared to the teacher’s popsicle stick?

S: 3 centimeters.

T: So, for that round, the teacher got three points because his stick was 3 centimeters longer than my marker. He tried to get 15 points for that one, but I’m glad we figured out that he only gets 3 points.

Repeat the process by having students work with their centimeter cubes, measuring using the following contexts.

Model as much as appropriate.

- Measure a new colored pencil and an unsharpened pencil as in the game between the two teachers.
- One student measures and compares the lengths of a crayon and a glue stick to see which item is shorter and by how much.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Reading word problems aloud facilitates problem solving for those students who have difficulty reading the text they are presented with. Make sure students with reading difficulties are not held back by the reading when they are able to solve the math problems.
Kelly is knitting a scarf for her doll. It needs to be 13 centimeters long. She has already knitted 9 centimeters. How many more centimeters need to be knitted?

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

Note: For the Problem Set, students will use actual centimeter cubes to solve the problems.

**Student Debrief (10 minutes)**

**Lesson Objective:** Answer compare with difference unknown problems about lengths of two different objects.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

 Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Look at Problems 3 and 4 on the first page. What do you notice about the answers? Explain to your partner why this is so.
- Look at Problem 4 on the second page. Can you think of a number sentence that can help you check your answer?
- What strategy helped you when you tried to find the difference between two objects? (Counting on.)
- Look at today’s Application Problem. How does it apply to today’s lesson?
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Topic D

Data Interpretation

1.OA.1, 1.MD.2, 1.MD.4

Focus Standard:

1.OA.1  Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (See Glossary, Table 1.)

1.MD.2  Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.

1.MD.4  Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Instructional Days: 4

Coherence
- Links from: GK–M3  Comparison of Length, Weight, Capacity, and Numbers to 10
  -Links to: G2–M2  Addition and Subtraction of Length Units
  G2–M7  Problem Solving with Length, Money, and Data

Topic D closes the module as students organize, represent, and interpret personally relevant data in Lesson 10 (1.MD.4). As students work as a class to collect, sort, and organize data into a graph, they find great purpose and excitement in data. They begin to answer, and then ask questions about, the number of data points in a given category, and in two categories.

For Lesson 11, students take a more independent role in the collecting, sorting, organizing, and representing phases involved in graphing. They work on their own to ask and answer questions about the data set, which prepares them for the comparison work of the last two lessons.

In Lesson 12, students interpret information presented in the graphs by exploring compare with difference unknown problems. They begin with visualizing these problems in their easily accessible “equalizing” contexts, by answering questions such as, “How many more students would Category A need to have the same amount as Category B?” Students use their understanding of comparing lengths from Topics A, B, and C to now compare the responses in three categories.
Lesson 13 continues this exploration, with students again interpreting data sets to ask and answer varied word problems including, “How many students were polled in all?” and, “How many more students are in Category C than in Category A?” (1.OA.1). Throughout Topic D, students also apply the learning from earlier in the module, as they lightly notice the connection between length units and data points on a graph.

A Teaching Sequence Towards Mastery of Data Interpretation

Objective 1: Collect, sort, and organize data, then ask and answer questions about the number of data points. (Lessons 10–11)

Objective 2: Ask and answer varied word problem types about a data set with three categories. (Lessons 12–13)
Lesson 10

Objective: Collect, sort, and organize data, then ask and answer questions about the number of data points.

Suggested Lesson Structure

- Fluency Practice (13 minutes)
- Application Problem (5 minutes)
- Concept Development (32 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (13 minutes)

- Happy Counting 1.OA.5, 1.NBT.5 (3 minutes)
- Race and Roll Subtraction 1.OA.6 (4 minutes)
- Subtraction Within 20 1.OA.6 (6 minutes)

Happy Counting (3 minutes)

Note: Practice with counting forward and backward by tens and ones strengthens students’ understanding of place value. Counting by twos and fives strengthens addition and subtraction skills.

Repeat the Happy Counting activity from G1–M3–Lesson 2. Choose a counting pattern and range based on your students’ skill level. If proficient with counting by ones, twos, fives, and tens to 40, start at 40 and go to 80. If proficient between 40 and 80, work between 80 and 120. Alternate between counting the regular way and the Say Ten way to reinforce place value.

Race and Roll Subtraction (4 minutes)

Materials: (S) 1 die per set of partners

Note: This fluency activity reviews the grade level standard of subtracting within 20.

Partners start at 20 and take turns rolling the die to subtract the number rolled from the total. (For example, Partner A rolls 3 and says, “20 – 3 = 17.” Partner B rolls 2 and says, “17 – 2 = 15.”) They continue rapidly rolling and saying number sentences until they reach 0, which they must hit precisely. Partners stand when they reach 0. Repeat the game as time permits.
Subtraction Within 20 (6 minutes)

Materials: (T) Hide Zero cards (S) Personal white boards

Note: This review fluency helps strengthen students’ understanding of the take from ten and take from the ones subtraction strategies, as well as their ability to recognize appropriate strategies based on problem types.

T: (Show 14 with Hide Zero cards.) How can I take 14 apart to help me subtract?
S: 10 and 4.
T: I want to subtract 2 from 14. Write a number sentence to show whether I should subtract 2 from the 4 or the 10.
S: (Write 4 – 2 = 2.)
T: Why wouldn’t I take from my 10?
S: You don’t need to because you have enough ones.
T: Yes! It’s much easier to just subtract from my ones! Since 4 – 2 = 2, 14 – 2 is? Write the subtraction sentence.
S: (Write 14 – 2 = 12.)
T: (Replace the 4 Hide Zero card with a 2.) Yes!

Repeat with 14 – 5, eliciting that you need to take from ten because there are not enough ones. Repeat with similar problems.

Application Problem (5 minutes)

There were 14 items on the table to measure. I already measured 5 of them. How many more items are there to measure?

Note: The use of the word measure in this problem raises a level of complexity as students may expect to use a measuring tool to solve. This problem encourages students to consider the context of the whole problem rather than focusing solely on key words.
Lesson 10

Collect, sort, and organize data, then ask and answer questions about the number of data points.

Date: 7/30/13

3.D.5

Lesson 10

Concept Development (32 minutes)

Materials: (T) 3 pieces of chart paper (S) 1 jumbo popsicle stick and a marker (distributed at each seat), personal white board

Note: Before today’s math lesson begins, prepare three charts:

Chart 1: Favorite Read Aloud Books
Chart 2: Favorite Read Aloud Books with a blank table labeled with Number of Students
Chart 3: Favorite Sports with a blank table labeled with Name of Sport and Number of Students

Also, later in the lesson, students will be asked to vote for one of three sports. A topic other than sports can be used to match the class’s preference. The lesson requires that only three choices be provided from which the students can pick. Model for students that when making a table of information, as they will be making today, the symbols within the table all need to be the same.

Have students come to the meeting area with their personal white boards and sit in a semi-circle formation.

T: I want to find out which read aloud books from first grade you like the most. Can you name some of the books we read together this year?

S: (Answers may vary. Choose three titles and write them on Chart 1. You may want to use the most important word from the title to alleviate students from writing many words during the following activity.)

T: Let’s collect some information, or data, to find out how many students like which books the most. How should we collect our data?

S: Ask each student, and then write their name down next to the book title. Call out each title and ask us to raise our hands if it is our favorite book.

T: Each of you has a popsicle stick at your table. Decide which book you liked the most out of these three choices. Then, write the name of the book on the popsicle stick. Come up to this chart and place your stick anywhere. (Lay the chart on the floor in the middle of the meeting area.)

S: (Write down their favorite book and freely place them on the chart.)

T: Wow, this chart is filled with ___ (the number of students) popsicle sticks. How many students liked Book A? (Give five seconds for students to count.)

S: (Answers may vary.) I can’t count that fast! I need more time.
T: We have different answers and some people didn’t even get to finish counting! How can we make counting these popsicle sticks easier?

S: After we count each popsicle stick, take it off so we can keep track of which ones we have already counted. Get all the popsicle sticks for each book and put them together. We should separate and sort them. We should organize these sticks by book titles!

T: These are great ideas. I agree! Here is a table. It will help us organize our information or data. (Lay Chart 2 on the floor and write in the titles. Ask a few student volunteers to rearrange their popsicle sticks in a horizontal line next to each book title.)

T: Now is it easier to see?

S: Yes!

T: How can we organize the data so we can count more efficiently and see more easily?

S: Group them by twos. Group them by fives. Put them in 5-group rows!

T: I love the idea of organizing them into groups of 5. In fact, we are going to arrange some of these sticks in a special way to show groups of 5. Help me count as I show you how this is done.

S: 1, 2, 3, 4, 5. (Count as the teacher points to each popsicle stick.)

T: Stop! Since we have a group of 5 here, I’m going to take the fifth stick and lay it across the others. (Model.) Show me in the air how this group of 5 is made as we count from 1 through 5 again.

S: 1, 2, 3, 4, 5. (Make tally marks in the air with teacher modeling.)

T: You just used tally marks. Tally marks come in groups of 5 where the fifth line always goes across the rest of the four lines. Let’s continue with the rest of these sticks.

Students count to 5 and make tally marks in the air as the teacher makes tally marks with popsicle sticks. After a few, ask student volunteers to rearrange the remaining popsicle sticks.

T: Great job organizing the data by sorting the information we collected. Now we can see and count our information more easily.

Count the tally marks for each book title and record the number directly on the table. Invite students to interpret the data by posing questions such as those below.

- How many students liked Book A the most?
- How many students liked Book A or Book B the most? (Note: Because the question says "or," students need to add the number for A and the number for B.)
- Which book is most liked by our classmates? Least liked?
Repeat the process with favorite sports using football, basketball, and soccer as the three choices. Alternatively, you may use a theme other than sports if it would have more appeal for your class. Another strategy is to offer other as a choice. Students may use the back of the original popsicle sticks to record their choice. After creating the table on Chart 3, have students write down their answers as you ask the following questions:

- How many students chose football as the sport they like best?
- How many students chose basketball as the sport they like best?
- How many students chose soccer as the sport they like best?
- What is the total number of students who like soccer or basketball the best?
- Which sport received the most votes?
- Think of a question you could ask a friend about the table.

Note: Save these tables for reference in the future lessons in this topic.

**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

**Student Debrief (10 minutes)**

**Lesson Objective:** Collect, sort, and organize data, then ask and answer questions about the number of data points.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

 Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How is making a table helpful when we are looking at a lot of information?
- Why is sorting and organizing data important when you are making a table?
- In what ways do tables help us see information in a quicker and easier way?
- Share the problem you made up using the favorite sports table. Solve each other’s questions and check your answers.
- How are 5-group rows and tally marks similar? How are they different?
- Why is using tally marks better than using 5-group rows when making a table?

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 11

Objective: Collect, sort, and organize data, then ask and answer questions about the number of data points.

Suggested Lesson Structure

- Fluency Practice (10 minutes)
- Application Problem (5 minutes)
- Concept Development (35 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (10 minutes)

- Sprint: Subtraction Within 20 1.OA.6 (10 minutes)

Sprint: Subtraction Within 20 (10 minutes)

Materials: (S) Subtraction Within 20 Sprint

Note: This Sprint addresses the Grade 1 objective of subtracting within 20. This is the second time students are seeing this Sprint. Ask students if they were able to complete more problems than the last time they tried this Sprint.

Application Problem (5 minutes)

Larry asked his friends whether dogs or cats are smarter. Nine of his friends think dogs are smarter and 6 think cats are smarter. Make a table to show Larry’s data collection. How many friends did he ask?

Note: This Application Problem reviews data collection (G1–M3–L10). Some students may show their work with simple shapes such as lines or circles, while others may experiment with tally marks.
Lesson 11

NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 11

Lesson 11: Collect, sort, and organize data, then ask and answer questions about the number of data points.

Date: 7/30/13

Notes on Multiple Means of Engagement:

Connect literature with the table students will be making in class today. Maybe you have a favorite selection, or you can visit your school librarian to check one out. Read it before making the table to get your student’s ready with ideas.

Concept Development (35 minutes)

Materials: (T) Chart paper with a table entitled, Favorite Rainy Day Activities with Activity and Number of Students on the top line, class list (S) Clipboard, class list (preferably with first names in alphabetical order)

Have students sit in the meeting area in a semi-circle formation.

T: (Post the chart.) Let’s brainstorm some of our favorite rainy day activities and make a table to see how many students like which activity the best and compare the information. To make this table, what do we need to do first? Turn and talk to your partner.

S: (Answers may vary.) We need to figure out the choices we will vote on.

T: You are right! What are some of your favorite things to do on a rainy day?

Answers may vary. Choose three activities and write them down on the chart in the first column. For example, they could be read a book, watch a movie, and play board games.

T: Now what do we do? Turn and talk to your partner.

S: We need to ask around and get everyone to vote. → We need to write down who likes which activity the best. → We can use 5-group rows to show our votes. → We can use tally marks to show everyone’s votes.

T: If we want to compare the information on the table, what do you think is the best way to record the information? Why?

S: (Answers may vary.) 5-group rows help me see better because I can line them up with the other rows. → I like using the tally marks because I can count more quickly.

T: Good thinking! (Project the class list.) To make sure I interview everyone and get everyone’s vote, I’m going to use the class list to help me keep track of who answered my question and what they voted for. (Start from the top of the list. Model collecting data using the class list by asking the first seven to eight students on the class list. Check off each name as a student volunteer either makes tally mark or draws a circle in 5-group rows on the table to represent each vote.)

To save time, ask the rest of the students to raise their hand as you call out a choice. Elicit one to two questions to interpret the data, and have students come up with additional questions for their partners to answer including any of the following:

- How many students like to [watch a movie] the most on a rainy day?
- Which rainy day activity is liked the most least by our class? The least? How can you tell from the table?
- How many students like to [read a book] or [play board games] the most on a rainy day?
- If two more students voted for [watching a movie], how many students would like [watching a movie] the best?

MP.3
T: Just like we created this entire table as a class, you will now get to create your own table! Let’s look at the Problem Set together to see how!

**Problem Set (20 minutes)**

Students should do their personal best to create questions based on their tables in the Problem Set and answering their partner’s questions within the allotted 20 minutes.

Read over the Problem Set directions and go over the steps to follow. Distribute the Problem Set and a class list. Give students approximately 20 minutes to collect and organize their data.

Students who need more structured directions can work in a small group with the teacher for step-by-step guidance.

Photocopy today’s Problem Set on two separate sheets of paper so that students can set their papers side by side as they refer to their tables and design questions.

**Student Debrief (10 minutes)**

**Lesson Objective:** Collect, sort, and organize data, then ask and answer questions about the number of data points.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How did you organize your data?
- How could you have used tallies? Pictures? Shapes? What other ways might someone organize data?
- How did you solve Problem 4?
• How did you solve Problem 5? How can you solve Problem 5 by looking at your notes on the class list? Which would be easier to use to find the answer, the class list or the table?
• Look at your Application Problem. How did you organize your data? How did you solve the problem?

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 12

Objective: Ask and answer varied word problem types about a data set with three categories.

Suggested Lesson Structure

- Fluency Practice (15 minutes)
- Application Problem (5 minutes)
- Concept Development (30 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (15 minutes)

- Addition with Cards 1.OA.6 (7 minutes)
- Get to 10 or 20 1.OA.5 (3 minutes)
- Subtraction with Partners 1.OA.6 (5 minutes)

Addition with Cards (7 minutes)

Materials: (S) 1 pack of numeral cards 0–10 per pair (from G1–M1–Lesson 36), counters (if needed)

Note: This review fluency strengthens students’ abilities to add within and across ten.

Students place the deck of cards face down between them. Each partner flips over two cards and adds the numbers. The partner with the greatest total keeps the cards played by both players. The player with the most cards at the end of the game wins. If there is a tie, players each turn over one final card. The player with the greater number wins. If the cards are of equal value, they continue to turn over a card until there is a winner.

Get to 10 or 20 (3 minutes)

Materials: (T) 20-bead Rekenrek

Note: Practicing getting to 10 or 20 reinforces strategically counting on, which enables students to solve addition problems by stopping at 10 and continuing to the desired number.

NOTES ON MULTIPLE MEANS FOR ACTION AND EXPRESSION:

When playing games with your students, provide a variety of ways to respond. Oral fluency games should be adjusted for deaf and hearing impaired students. This can be done in many ways including showing the answer with fingers, using student boards to write answers, or using a visual signal or vibration.
T: (Show 8 on the Rekenrek.) What number do you see?
S: 8.
T: Give me the complete number sentence to get to 10.
S: 8 + 2 = 10.
T: (Move two beads to make 10.) Good. (Show 18.) What number do you see?
S: 18.
T: Give me the complete number sentence to get to 20.
S: 18 + 2 = 20.

Add two beads to confirm, then continue with other numbers within 20.

**Subtraction with Partners (5 minutes)**

Materials: (S) Personal white boards

Note: This fluency reviews subtracting 7, 8, and 9 from teen numbers. Allow students who still require pictorial representations to draw 5-groups to solve.

Assign partners of equal ability. Partners assign each other a number from 11 to 17 (e.g., 12). On their personal white boards, they write number sentences with 9, 8, and 7 as the subtrahend and solve them (e.g., 12 − 9 = 3, 12 − 8 = 4, 12 − 7 = 5). Partners then exchange white boards and check each other’s work.

**Application Problem (5 minutes)**

Kingston’s class took a trip to the zoo. He collected data about his favorite African animals. He saw 2 lions, 11 gorillas, and 7 zebras. What does his table look like? Write one question your classmate can answer by looking at the table.

Note: Students may use any of the methods to collect data from the previous lessons. As they are working, circulate and notice how students are representing the data. Encourage them to line up their shapes and focus on organization. Remind students that they need to use the same symbol to represent the information throughout their table. Representations should make counting and comparing data easy. During the Debrief, the students will share and answer their partners’ questions.
Lesson 12

Lesson 12: Ask and answer varied word problem types about a data set with three categories.

Date: 7/30/13

3.D.26

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Concept Development (30 minutes)

Materials: (T) Chart with a three-column vertical graph entitled Our Favorite Fruits, chart with rules of proper measuring from G1–M3–Lesson 8 (post on the side of the board), Favorite Read Aloud Books from G1–M3–Lesson 10 (S) Sticky notes, personal white boards

Distribute one sticky note at each student’s seat. Have students sit in the meeting area in a semi-circle formation.

T: (Post Our Favorite Fruits graph.) What are some of your favorite fruits?
S: (Responses may vary. Choose only three, or possibly four, categories from the students’ suggestions.) Strawberries. → Watermelon. → Apples.

Fill in the three categories as students make suggestions. Have students go back to their seats, write their names on sticky notes, and come back to the meeting area with them.

T: My vote is for strawberry as my favorite fruit. I’m going to place it right beneath the line where it says Strawberry. (Model.) Who likes watermelon the best? (Choose a student to come up.) He’s also going to place his sticky note, right beneath the line where it says Watermelon. (Choose another student to come up and place her sticky note for Apple. Be sure to have these sticky notes aligned with each other.)

T: We need one more person who likes strawberries the most. (Have the student come up.) When he puts his sticky note, he’s going to put it right beneath my sticky note, so there are no overlap or gaps.

T: (Call up one third of the class to post their votes, encouraging them to avoid making gaps or overlaps between the sticky notes.) What do you notice about the rules of completing this chart with our votes on the sticky notes?
S: The rules are just like the rules for measuring! → We had to line up our endpoints when we first started! → We couldn’t have any overlaps or gaps. → The sticky notes are the same size, the same length unit.

T: Excellent connections! Let’s have the rest of the class complete the graph as they put up their votes following these rules.

T: Which fruit is the most popular among our students? Which fruit has the least number of votes? How can you tell?
S: I counted. The fruit with the highest total is the most popular. → I just looked at the sticky notes. The longest strip of notes means the most votes. The shortest strip means the least number of votes. → This reminds me of measuring again! The one that used the most length units to measure is the longest one, and that is the most popular fruit!

T: How many students voted for strawberries? Watermelon? Apples? (Record the number amount on the graph.) When we organize our data this way, it makes it easy for us to compare. We call this a graph. A graph lets us see the data easily. In this graph, it lines up our data just like when we
measure lengths of different items, so we can easily compare.

T: (Point to the corresponding parts of the graph and ask.) Which received more votes, strawberries or watermelon?
S: Category ____.
T: Did you have to look at the numbers for each, or could you see it just by looking at the lengths of the bars?
S: I just looked at the bar. → The longer bar has more.
T: How many more students would Category A need to have the same amount as Category B? Tell your partner how you figured it out.
S: I just counted the part that was longer, the part that was sticking out. → I used subtraction. → I used addition with a mystery number in the middle. → This reminds me of measuring again! We used all of these strategies when we tried to figure out which length was longer when we compared two things!
T: You are right! So, how many more votes did Category ____ receive than Category ____?
T: (Using the same two categories as above, rephrase the question.) How many fewer votes did Category ____ receive than Category ____?

Continue to ask compare with difference unknown problems and put together with result unknown problems presented by this graph. Ask students to write a number sentence to show how they got their answer using their personal white boards. If time allows, use Favorite Read Aloud Books from G1–M3–Lesson 10 to answer more compare with difference unknown problems. Students may work with their partners to answer each other’s questions.

### Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

### Student Debrief (10 minutes)

**Lesson Objective:** Ask and answer varied word problem types about a data set with three categories.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.
You may choose to use any combination of the questions below to lead the discussion.

- What are the strategies to figure out how many more or fewer votes a category received compared to the other?
- How are tables and graphs similar? How are they different? (Tables and graphs both organize information. With a graph, the information can be compared in a way similar to how length units can be compared.)
- How are the graphs in Problem 3 and 5 different? How are they similar?
- How is measuring objects similar to creating graphs like these to compare information about different categories?
- How does a graph that is created properly help you see and understand its information better? Did you follow these rules when you made your graph for Problem 1?
- Look at your Application Problem. What question did you come up with? Share with your partner and answer each other’s questions.

**Exit Ticket (3 minutes)**

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.
Lesson 13

Objective: Ask and answer varied word problem types about a data set with three categories.

Suggested Lesson Structure

- Fluency Practice (18 minutes)
- Application Problem (5 minutes)
- Concept Development (27 minutes)
- Student Debrief (10 minutes)
- Total Time (60 minutes)

Fluency Practice (18 minutes)

- Hide Zero Number Sentences 1.NBT.2, 1.NBT.4 (3 minutes)
- Add Three Numbers 1.OA.2 (5 minutes)
- Sprint: Add Three Numbers 1.OA.2 (10 minutes)

Hide Zero Number Sentences (3 minutes)

Materials: (S) Hide Zero cards (from G1–M1–Lesson 38, with additional cards found at the end of this lesson)

Note: This fluency activity strengthens the understanding of place value and prepares students for Module 4. Show students numbers from 10 to 40 with Hide Zero cards (e.g., 15). Students say an addition sentence with 10 as an addend (e.g., 10 + 5 = 15). As students say the sentence, pull apart the Hide Zero cards to model the equation. Alternate asking students to say the numbers the Say Ten way and the regular way.

Suggested sequence: 15, 25, 35; 14, 24, 34; 16, 26, 36; etc.

Add Three Numbers (5 minutes)

Materials: (S) 3 dice per pair of students, personal white boards

Note: This is review fluency for adding three numbers.

Assign students partners. Partners take turns rolling the three dice and adding them together. The partner with the highest sum each round scores a point. If there is a tie, players should keep playing until one of them has the highest sum. The person with the highest sum after the tie scores two points. Students record points with tally marks on their personal white boards.
Sprint: Add Three Numbers (10 minutes)

Materials: (S) Add Three Numbers Sprint

Note: This Sprint provides students practice with adding three numbers within 20 and encourages students to apply properties of operations as strategies to add.

Application Problem (5 minutes)

Zoe wanted to make a friendship necklace for her closest friends. Make a graph to show the two colors of beads she used. She used 8 green beads for Lily, 4 purple beads for Jamilah, and 12 green beads for Sage. How many green beads did she use?

Note: As students finish, ask additional questions to help them interpret the data, focusing on Grade 1 problem types.

- How many more purple beads would need to be used to have the same amount as the green beads?
- How many fewer beads does Lily have than Sage?
- If Lily added 3 beads to her necklace, how many more beads would she need to have the same amount as Sage?

Concept Development (27 minutes)

Materials: (T) Graph entitled Favorite Things to Make with Snow
(S) Personal white boards

Note: Adjust the Concept Development as necessary based on your observations of student successes and challenges during Lesson 12, as well as during the most recent Application Problems. Today’s Concept Development is an opportunity to continue supporting student understanding of the compare with difference unknown problem types using appropriate number sentences as they interpret the given data.

Have students gather in the meeting area in a semi-circle formation with their personal white boards.

T: (Post the chart.) Here’s a graph I made yesterday after talking to the children in my neighborhood. I asked what they like to do in the snow, and this is what they said. What do you notice about this graph that is different from the graphs we used yesterday? What is similar?

S: The starting point is on the bottom on this graph. Yesterday, we started from the top. Today, they are built like towers. → But it’s still following the rules. → No overlaps. → No gaps. → The same
Lesson 13

Ask and answer varied word problem types about a data set with three categories.

NOTE

SOURCES FOR ACTION AND EXPRESSION:

Asking questions for comprehension during this lesson is important to guide students to evaluate their thinking. This provides students an opportunity to evaluate their process and analyze errors.

endpoints.

T: Turn and talk to your partner about what you notice. What information can you gather from reading this graph?

Answers may vary. Be sure to record how many votes each category received.

T: How many people prefer building a snowman over making snow angels? How did you figure it out?

S: I looked at the snowman and snow angels columns. I counted on from 4 since they both have 3 votes. I already know that there are 3 votes for snow angels and 12 votes for the snowman, so I took away 3 from 12 and got 9.

T: I noticed that yesterday, many students counted to figure out which had more or fewer votes. What subtraction sentence can you use to solve this problem?

S: 12 − 3 = 9.

T: Explain to your partner how both of these strategies are related.

T: No matter how you solve this, we can use the number sentence 12 − 3 = 9 as a way to show how we solved the problem.

Continue to ask compare with difference unknown and put together with result unknown problems, encouraging students to include a number sentence. In all problems, have students discuss how both counting on and using a subtraction sentence are related to one another. You may use the following suggested sequence:

- How many more children prefer making the snowman over building a fort?
- Making the snow angel over building a fort? Making the snowman or the snow angel?
- How many children took this poll? (Note: Students might not be familiar with the word poll. Explain that a poll is a situation in which people vote. The teacher can give the example that, in this case, students were polled about their favorite things to make with snow.)

In the next set of questions, encourage students to visualize how the graph might change based on the information presented in the following situations:

- How many more votes do we need if we want to make the number of votes for building the fort the same as making the snowman?
- Some more children came by and answered the question. If there were 20 children total that answered the question, how many more children came by and voted?
- If 4 more children came along and said they like building snow forts the most, then how many votes would there be for building forts?

In the beginning, you might want to use additional sticky notes or tiles for those students who need the concrete–visual support. Again, encourage students to use a number sentence to solve.
**Problem Set (10 minutes)**

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first.

**Student Debrief (10 minutes)**

**Lesson Objective:** Ask and answer varied word problem types about a data set with three categories.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- How is using the counting on strategy related to using a subtraction sentence when looking for how many more or fewer votes one received when comparing two categories?
- How is using the counting on strategy related to using an addition sentence when combining the votes for two or more categories?
- When is it more efficient to use number combinations to solve rather than counting on?
- Look at Problem 1. Which problem on Page 2 connects to this one? How do you know?
- How are the Favorite Fruit and School Day Weather graphs set up differently?
- Explain how you solved Problem 10 to your partner. Compare how each of you solved the problem.
- How did the Application Problem connect to today’s lesson?
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students’ understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.