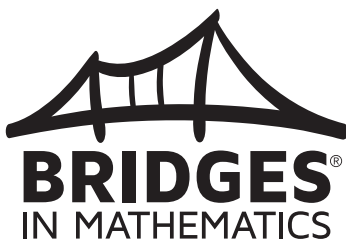


Teachers Guide

GRADE 3 – UNIT 4 – MODULE 2

Preview



Module 2

Measuring Volume & Solving Measurement Story Problems

Session 1 Measuring Liquid Volume.....	3
Session 2 Measurement Scavenger Hunt.....	7
Session 3 Measurement Story Problems	11
Session 4 More Measurement Problems	17
Session 5 Multi-Step Measurement Problems Forum	23

Teacher Masters

Pages renumber with each module.

Time Checkpoint	T1
Work Place Guide 4B Measurement Scavenger Hunt ..	T2
4B Measurement Scavenger Hunt Record Sheet.....	T3
Unit 4 Work Place Log.....	T4
Work Place Guide 4C Target One Thousand.....	T5
4C Target One Thousand Record Sheet	T6
Bird Measurement Problems Forum Planner	T7
More Measurement Problems Forum Planner	T8

Student Book Pages

Page numbers correspond to those in the consumable books.

Which Container Is Best?	115
Liquid Volume	117
Work Place Instructions 4B	
Measurement Scavenger Hunt.....	118
More or Less?	119
Work Place Instructions 4C Target One Thousand.....	120
Bird Measurement Problems	121
Mr. Measure	123
More Measurement Problems.....	124
Millie Millipede.....	126
Arnie Orangutan.....	127

Home Connections Pages

Page numbers correspond to those in the consumable books.

Metric Measures of Mass & Liquid Volume	67
Grasshopper Math	69

Module 2

Measuring Volume & Solving Measurement Story Problems

Overview

Students continue their work with measurement in this module, first investigating liquid volume and then learning a new Work Place activity offering hands-on opportunities to estimate mass, liquid volume, and length. Sessions 3, 4, and 5 feature two sets of measurement-related story problems and two math forums. Students compare strategies for solving problems that necessitate identifying the operations needed, and which in some cases require more than one step and one operation to solve.

Planner

Session & Work Places Introduced	P&I	MF	WP	A	HC	DP
<p>Session 1 Measuring Liquid Volume This session begins with a quick checkpoint on time. Then, students use containers of different capacities to estimate, measure, and solve problems about liquid volume and capacity.</p>	●			●		●
<p>Session 2 Measurement Scavenger Hunt The teacher introduces a new Work Place activity, Measurement Scavenger Hunt. Students then spend the rest of the session visiting Work Places.</p> <p>Work Place 4B Measurement Scavenger Hunt Players work together to make, pour or find certain measurements. They spin two spinners—a measurement spinner indicating mass, volume, or length and a quantity spinner indicating 100, 250, 500, or 750 grams, milliliters, or millimeters. Students try to mold clay, pour water, or search for an object that matches the length they spun on the quantity spinner. Then they find the actual measurement to see how close they came, and record the results to fill up their record sheets.</p>			●		●	●
<p>Session 3 Measurement Story Problems The teacher introduces Work Place 4C Target One Thousand by playing a couple of rounds with the class. This game provides intensive practice with place value and 3-digit computation. Then, the teacher shares a set of measurement-related story problems with the class and works with students to review key addition and subtraction strategies before they go to work.</p> <p>Work Place 4C Target One Thousand Players take turns drawing 8 Number Cards, and then each chooses 6 of these cards to make two 3-digit numbers with a sum as close to 1,000 as possible (over or under). Each player finds the exact difference between their sum and 1,000. After 3 rounds, each player adds their differences, and the player with the lower total wins.</p>	●		●			●
<p>Session 4 More Measurement Problems This session begins with a math forum in which students share their work from Session 3. The discussion centers around selecting and using the correct operation, as well as choosing effective models and strategies. After the forum, students work in pairs on measuring story problems that require more than one step and one operation to solve.</p>	●	●			●	●
<p>Session 5 Multi-Step Measurement Problems Forum Students share their work with multi-step measurement problems in a math forum. Then, they spend the remainder of the session in Work Places. The teacher pulls small groups of students to provide differentiated instruction as needed.</p>		●	●			●

P&I – Problems & Investigations, **MF** – Math Forum, **WP** – Work Place, **A** – Assessment, **HC** – Home Connection, **DP** – Daily Practice

Materials Preparation

Each session includes a complete list of the materials you'll need to conduct the session, as well as notes about any preparation you'll need to do in advance. If you would like to prepare materials ahead of time for the entire module, you can use this to-do list.

Task	Done	
Copies	Run copies of Teacher Masters T1–T8 according to the instructions at the top of each master.	
	Run a single display copy of Student Book pages 115 and 121–122.	
	If students do not have their own Student Books, run a class set of Student Book pages 115–127.	
	If students do not have their own Home Connections books, run a class set of the assignments for this module using pages 67–70 in the Home Connections Book.	
Work Place Preparation	Prepare the materials for Work Places 4B–4C using the lists of materials on the Work Place Guides (Teachers Masters T2, T5).	
Special Items	Before Session 1, find one 0.5 ml water bottle per 3 students and a single 50-milliliter container (suggestions: travel-size bottle of toiletries or small contact lens solution container). In addition, for each table of 6 students, gather 8 or more beverage containers of varying capacity (e.g., pop can, water bottles of various sizes, small children's cup, drink containers from restaurants including an extra-large or super-size).	



Additional Resources

Please see this module's Resources section of the Bridges Educator site for a collection of resources you can use with students to supplement your instruction.

Preview

Session 1

Measuring Liquid Volume

Summary

This session begins with a quick checkpoint on time. Then, students use containers of different capacities to estimate, measure, and solve problems about liquid volume and capacity.

Skills & Concepts

- Tell and write time to the nearest minute; solve story problems involving addition and subtraction of time intervals in minutes (3.MD.1)
- Estimate and measure liquid volume in liters and milliliters; solve story problems involving addition, subtraction, multiplication, and division of volume measurements given in liters and milliliters (3.MD.2)
- Use appropriate tools strategically (3.MP.5)
- Attend to precision (3.MP.6)

Materials

Copies	Kit Materials	Classroom Materials
Assessment Time Checkpoint		
TM T1 Time Checkpoint	• student clocks	
Problems & Investigations Measuring Liquid Volume		
SB 115–116* Which Container Is Best?	<ul style="list-style-type: none"> • 1-cup/250-ml measuring cups (1 per group of 3 students) • 1-quart/1-liter measuring cups (1 per group of 3 students) 	<ul style="list-style-type: none"> • 4–6 cafeteria trays (see Preparation) • 4–6 bath towels or paper towels (see Preparation) • 4–6 pitchers or other containers with pour spouts (see Preparation) • empty half-liter water bottle (1 per 3 students) • 1 empty 50 ml container (e.g., travel-size shampoo, lotion, or contact lens solution bottle) • beverage containers of varying capacity, labeled (8 or more per table of 6 students; see Preparation)
Daily Practice		
SB 117 Liquid Volume		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
Copy instructions are located at the top of each teacher master.

* Run 1 copy of this page for display.

Preparation

- Before this session, use one of the 250-ml measures to pour 250 ml of water four times into one of the liter measures. Observe the relative levels of accuracy of the two measures so that you'll be prepared to discuss accuracy with students if it comes up during today's activity.
- Students will work in groups of 3 to do the measuring activities today. You will want to organize the room and the materials so that 2 groups—6 students total—can work at each table or cluster of desks. Organize the following materials onto a cafeteria tray for each table:
 - » A pitcher or other container with a pour spout, such as a half-gallon milk carton, filled with about 2 quarts of water.
 - » A small bath towel or a handful of paper towels for clean-up of spilled water.
- Hold in reserve an empty half-liter water bottle for each group of 3 students.
- Later in the session, each table of 6 students will also need access to 8 or more beverage containers of varying capacity, each container labeled with an alphabet letter. Examples of containers include pop cans, water bottles of various sizes, toddlers' cups, coffee mugs, drink containers from fast food places—including extra-large or super-size cups.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

cup*
customary system*
liquid volume*
liter (l)*
metric system*
milliliter (ml)*
quart (qt.)*



Assessment

Time Checkpoint

- 1 Open the session by telling students they will take a quick checkpoint on time. Then they will do some more measurement activities.
- 2 Display the Time Checkpoint, and give each student a copy. Give students a minute to look over it and ask any questions, and then have them begin.
 - Make student clocks available to those individuals who want to use them to help with any of the items on the checkpoint.
 - Encourage students to read each question carefully, and remind them they can ask you for help reading any of the questions.
 - Remind students to work quietly by themselves.
 - While students work, circulate around the room to make observations and answer questions.
 - Give students about 10 minutes or so to do the checkpoint.
 - If some students finish earlier than others, ask them to read quietly.
- 3 Collect students' checkpoints.

SUPPORT. Since this is not a timed test, give students who are unable to complete the work more time to finish later in the day or early the next day.



Problems & Investigations

Measuring Liquid Volume

- 4 Ask the students to join you in the discussion area, and let them know they are going to be measuring liquid volume.
 - Invite volunteers to share what they already know about liquid volume.
 - Help students realize that they actually deal with liquid volume in their everyday lives, by posing questions such as the following:
 - » What kinds of liquids do their families buy at the store? How are some of those liquids packaged?
 - » Which holds more, a can of soda or a bottle of water? What about a carton of juice and a jug of milk?
 - » Can they name any units of measure for liquid volume by thinking about some of the containers of liquids they buy at the store?
 - » Which would they like for breakfast—a cup of milk, a quart of milk, or a gallon of milk? Why?
- 5 Then divide the class into groups of three. Ask students to get into their groups and sit together in the discussion area. Give each group a small and a large measuring cup.
 - Give them a minute to examine the two measuring cups carefully and share observations among themselves.
 - Ask students to find the mark near the top of the small measuring cup that shows 250 milliliters.
 - Then have them find the mark near the top of the large measuring cup that shows 1,000 milliliters (1 liter).

Assessment Guide

See the Grade 3 Assessment Guide for scoring and intervention suggestions.



Ongoing Assessment

If, in looking over the students' work, you find that some are struggling with telling time even to 5-minute increments, you might consider pulling a group of them together to play Tic-Tac-Tock during Work Places, using the game context as a way to provide more direct instruction in telling and writing time.

- 6 Ask the students in each group to share observations with one another about how the two measuring containers compare in size.

Here are some questions to spark students' thinking:

- How much bigger is the large measuring cup? How much smaller is the measuring cup?
- How much more will the large measuring cup hold than the small measuring cup? How do they know?
- What do the different markings on the containers indicate about how much they hold?

- 7 Send two groups of three students to each table with their measuring cups. Have one student from each table get the cafeteria tray of materials you prepared and carry it carefully to their table.

- 8 Now, ask each group of three students to fill their small measuring cup with water to the 250 milliliter mark and pour it into the large measuring cup. Have them repeat this step until the large measuring cup is full to the 1-liter mark, while keeping track of how many pours it takes to do so.

Ask a few volunteers to share their observations.

- 9 Next have each group of three fill their small measuring cup with 100 milliliters of water, and estimate how many pours of this volume it would take to fill the large measuring cup.

- Then have students pour the water they just measured from the small to the large measuring cup, and repeat the process until the 1-liter container is full, while counting how many 100-milliliter pours it takes to fill the liter container.
- Again ask students to share their observations.



- 10 Then hold up an empty half-liter water bottle (without stating its volume) and ask each group of three to fill their measuring cup(s) with the amount of water they think it will take to fill the bottle almost to the top.

Ask students to think in terms of the bottles of water, juice, or pop they get at the store. Are those bottles filled to the very top? Why not?

Accurate Measures

Most measuring devices are inaccurate to some degree, and the amount of inaccuracy differs from one device to another.

This means that students may find that no matter how precise they are in their measuring, four pours of 250 milliliters each might not seem to be exactly 1 liter in the larger measure.

You might discuss with your students how measuring cups like these are manufactured, the purposes for which they are designed, and what level of inaccuracy is acceptable in different contexts (such as in laboratory work, in cooking, and in math experiments).

- 11 Give each group of three a half-liter water bottle. Ask them to pour the water they just measured into the bottle.
- If students have estimated too much, ask them to stop before the bottle overflows.
 - Again ask students to share their observations.
 - Possible questions:
 - » Were they surprised by the amount of water the bottle held?
 - » About how many milliliters did the bottle hold? How do they know?
 - » How does the amount of water in the bottle compare to the large measuring cup? To their small measuring cup?
 - » If they had a container that only held 50 milliliters, how many pours would it take to fill the water bottle?

Pass around a 50-milliliter container to help students familiarize themselves with the size.

- 12 Have students get their Student Books and pencils for the next part of the activity. When they are seated in their groups again, display the first of the two Which Container Is Best? Student Book pages, and ask students to find the page in their books.
- Review the instructions at the top of the page with the class, and explain that you have a set of containers for each table to use. Show them that each container is marked with an alphabet letter, which they'll use to record their estimates and recommendations.
 - When students understand what to do, pass out the containers you prepared, one set for each table, and have them go to work.
 - Note with the students that only the problems on the first page require the measuring materials. They'll have the rest of the session to work on the assignment, and they really need to focus on completing problems 1, 2, and 3.
 - As they complete the first page, have the students at each table place all the measuring materials on the tray, carry the tray to a location you've designated, and return to their seats to complete the second page of the assignment.

SUPPORT Give students who aren't able to complete both pages during the period more time to do the second page within the next day or two.



Daily Practice

The optional Liquid Volume Student Book page provides additional opportunities to apply the following skill:

- Solve story problems involving addition, subtraction, multiplication, and division of volume measurements given in liters and milliliters (3.MD.2)

Session 2

Measurement Scavenger Hunt

Summary

The teacher introduces a new Work Place activity, Measurement Scavenger Hunt. Students then spend the rest of the session visiting Work Places. At the end of the session, the teacher introduces and assigns the Metric Measures of Mass & Liquid Volume Home Connection.

Skills & Concepts

- Estimate and measure liquid volume in liters and milliliters; estimate and measure mass in grams and kilograms (3.MD.2)
- Estimate and measure length in millimeters (4.MD.1)
- Use appropriate tools strategically (3.MP.5)
- Attend to precision (3.MP.6)

Materials

Copies	Kit Materials	Classroom Materials
Work Places Introducing 4B Measurement Scavenger Hunt		
TM T2 Work Place Guide 4B Measurement Scavenger Hunt TM T3 4B Measurement Scavenger Hunt Record Sheet TM T4 Unit 4 Work Place Log (see Preparation) SB 118* Work Place Instructions 4B Measurement Scavenger Hunt	<ul style="list-style-type: none"> • 1 spinner overlay • 1 measuring tape • 1 pan balance • 1-quart/1-liter measuring cup 	<ul style="list-style-type: none"> • meter stick marked in millimeters • modeling clay, about 2 pounds • a pitcher or other container with a pour spout, filled with about 1 liter of water • several containers of varying volume • dish towel or paper towel • students' Work Place folders (see Preparation)
Work Places in Use		
3A Round Ball Tens (introduced in Unit 3, Module 1, Session 2) 3B Add & Round Tens (introduced in Unit 3, Module 1, Session 3) 3C Round Ball Hundreds (introduced in Unit 3, Module 1, Session 4) 3D Round & Add Hundreds (introduced in Unit 3, Module 3, Session 1) 4A Tic-Tac-Tock (introduced in Unit 4, Module 1, Session 2) 4B Measurement Scavenger Hunt (introduced in this session)		
Home Connection		
HC 67–68 Metric Measures of Mass & Liquid Volume		
Daily Practice		
SB 119 More or Less?		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
 Copy instructions are located at the top of each teacher master.

* Run 1 copy of this page to be kept in a clear plastic sleeve in the Work Place bin.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

gram (g)*
 kilogram (kg)*
 liquid volume*
 liter (l)*
 metric system*
 milliliter (ml)*
 millimeter (mm)*

Preparation

- Remove the Unit 2 Work Place Log Teacher Master from the back of each student's Work Place folder, and replace it with a copy of the Unit 4 Work Place Log Teacher Master, stapled at all four corners. Leave the Unit 3 Work Place Log stapled to the front of each folder. This will allow students to keep track of the number of times they have visited the Unit 3 Work Places that will remain in use during Unit 4, and also track their progress through the new Work Places as they're introduced, starting today.
- In today's session, you'll introduce Work Place 4B Measurement Scavenger Hunt, which replaces Work Place 2D Doubles Help. Before this session, you should review the Work Place Guide, as well as the Work Place Instructions. Make a copy of the 4B Measurement Scavenger Hunt Record Sheet for use today in introducing the activity, and store the rest in the Work Place 4B Measurement Scavenger Hunt bin. See the set-up note on the guide for this Work Place. You will need to find a place in your classroom to set up and leave out several sets of measuring materials, rather than storing the materials in the Work Place bin the way you usually do.
- Write the list of Work Places from which students can choose today. You can just write the numbers (3C–4B) or write out the full names if you have time. (See the list in the Work Places in Use row of the Materials Chart for the complete list of Work Places used today.)



Work Places

Introducing Work Place 4B Measurement Scavenger Hunt

- 1 Let students know that they will use what they have been learning about measurement, mass, and volume in a new Work Place today.
- 2 Hold up a meter stick and quickly review the fact that there are 100 centimeters in a meter. You can also provide a preview to the Work Place activity by having students think of things that are about 10, 50, and 90 centimeters long.

Teacher This is a meter stick. Who can tell me how many centimeters there are in a meter?

Patrice One hundred.

Teacher Great. Who can suggest an object that is about 10 centimeters? 50 centimeters? 90 centimeters?

- 3 Then, introduce the millimeter as a very tiny unit of length.
 - If you can, put the meter stick on display on the document camera. Ask students what they know about the little lines within 1 centimeter. Do they know what they are called? Do they know how big they are?
 - Explain or have students explain that there are 10 millimeters in 1 centimeter and there are 1,000 millimeters in 1 meter. Let them know that the prefix “milli” means thousand.
 - Ask students to discuss in pairs and then report out how many millimeters there are in 10 centimeters, 20 centimeters, 50 centimeters.
 - Hold up a common object, such as a pointer, and ask students to estimate its length in centimeters. Then challenge them to estimate the length in millimeters.
- 4 Let students know that the Measurement Scavenger Hunt will use millimeters. Work with the class to find objects around the classroom that approximate the following lengths: 25 centimeters or 250 millimeters, 50 centimeters or 500 millimeters, and 75 centimeters or 750 millimeters.

5 Introduce the Measurement Scavenger Hunt activity.

- Display the 4B Measurement Scavenger Hunt Record Sheet Teacher Master where everyone can see it.
- Explain that the activity will help students estimate and measure items with different volume, mass, and length.

6 Briefly summarize the activity before showing the students how to do it.

Players work together to make, pour or find certain measurements. They spin two spinners—a measurement spinner and a quantity spinner. The spinners indicate the type of measurement (mass, volume, or length) and the quantity (100, 250, 500, or 750 grams, milliliters, or millimeters). If they spin mass, they will work with clay. If they spin volume, they will work with water. If they spin length, they will search for classroom objects of certain lengths. Players try to mold, pour, or search for an object that matches the amount they spun on the quantity spinner. Then they find the actual mass, volume, or length of the clay, water, or object to see how close they came, and record the results on their record sheets. They repeat these steps until they have completed their record sheets.

7 Invite volunteers to help you model the steps involved in the Measurement Scavenger Hunt two or three times. Use your copy of the Work Place Instructions as needed, and show students how to record the results of their work on a copy of the 4B Measurement Scavenger Hunt Record Sheet.

Teacher I'm going to invite 2 or 3 of you, one at a time, to spin both spinners and then make, pour, or search for an item that matches the amount spun on the quantity spinner. The rest of you will observe and then we will share what we are thinking.

8 As you and the volunteers model the steps involved in the Measurement Scavenger Hunt, pose questions like the following to promote flexible thinking and strategy development:

- How did you decide how much clay to use?
- How did you decide how much water to pour?
- How did you decide how to estimate how long an item should be?
- What other items or amounts could you use as benchmarks, to help you make good estimates?
- Which units do we use for mass, volume, and length?
- Do you have any tips that might make everyone's hunt easier?

SUPPORT Review how to use the pan balance scale to find out if the clay ball they made is greater than or less than the amount they spun.

9 Ask students to turn to a partner to summarize the directions for Measurement Scavenger Hunt.



Work Places

- 10 Have students get their folders and choose a Work Place.
- Have students pick up their Work Place folders and a pencil, and remind them to fill out their Work Place Logs as they finish each activity.
 - Note with them that you have attached Work Place Logs for Unit 4 to the backs of their folders, so if they have visited Work Place 4A Tic-Tac-Tock one or more times since it was introduced in the previous module, they can mark their new logs accordingly.
 - Take a moment to discuss how to clean up and leave a Work Place when students are finished and ready to try another Work Place activity. Focus especially on the clay and water in the Measurement Scavenger Hunt.
- 11 At the end of the session, gather your students together and close the session with a few final questions:
- Ask students what unit they would use if they were measuring mass (grams).
 - Ask them what they would be measuring if they unit was milliliters (volume).
 - Ask them to think of one unit they could use to measure length (answers will vary).
 - Ask them to think of something with a length of about 100 millimeters (answers will vary).



Home Connection

- 12 Introduce and assign the Metric Measures of Mass & Liquid Volume Home Connection, which provides more practice with the following skill:
- Estimate liquid volume in liters and milliliters; estimate mass in grams and kilograms (3.MD.2)



Daily Practice

The optional More or Less? Student Book page provides additional opportunities to apply the following skill:

- Estimate mass in grams and kilograms; estimate liquid volume in liters (3.MD.2)

Session 3

Measurement Story Problems

Summary

The teacher introduces Work Place 4C Target One Thousand by playing a couple of rounds with the class. This game provides intensive practice with place value and 3-digit computation. Then, the teacher shares a set of measurement-related story problems with the class, and works with students to review key addition and subtraction strategies before they go to work. As students complete the problems, they go to Work Places.

Skills & Concepts

- Use strategies based on place value, properties of the operation, or the relationship between addition and subtraction to fluently subtract with minuends to 1,000. (3.NBT.2)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)
- Solve story problems involving subtraction of volume measurements given in liters (3.MD.2)
- Solve story problems involving addition, subtraction, or multiplication of mass measurements given in grams (3.MD.2)
- Make sense of problems and persevere in solving them (3.MP.1)
- Model with mathematics (3.MP.4)

Materials

Copies	Kit Materials	Classroom Materials
Work Places Introducing Target One Thousand		
TM T5 Work Place Guide 4C Target One Thousand TM T6 4C Target One Thousand Record Sheet SB 120** Work Place Instructions 4C Target One Thousand	<ul style="list-style-type: none"> • Number Cards, 1 deck with the wild cards removed 	<ul style="list-style-type: none"> • Addition Strategies chart (saved from Unit 3, Module 1, Session 6) • Subtraction Strategies chart (saved from Unit 3, Module 2, Session 4) • scratch paper, class set
Problems & Investigations Measurement Story Problems		
TM T7 Bird Measurement Problems Forum Planner SB 121–122* Bird Measurement Problems		<ul style="list-style-type: none"> • chart paper or space to write on the whiteboard
Work Places in Use		
3B Add & Round Tens (introduced in Unit 3, Module 1, Session 3) 3C Round Ball Hundreds (introduced in Unit 3, Module 1, Session 4) 3D Round & Add Hundreds (introduced in Unit 3, Module 3, Session 1) 4A Tic-Tac-Tock (introduced in Unit 4, Module 1, Session 2) 4B Measurement Scavenger Hunt (introduced in Unit 4, Module 2, Session 2) 4C Target One Thousand (introduced in this session)		
Daily Practice		
SB 123 Mr. Measure		

HC – Home Connection, SB – Student Book, TM – Teacher Master

Copy instructions are located at the top of each teacher master.

* Run 1 copy of this page for display.

** Run 1 copy of this page to be kept in a clear plastic sleeve in the Work Place bin.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

gram (g)*
mass*
milliliter (ml)*
sum or total*

Preparation

- Post the Addition and Subtraction Strategies charts from Unit 3 where everyone can see them.
- In today's session, you'll introduce Work Place 4C Target One Thousand, which replaces Work Place 3A Round Ball Tens. Before this session, you should review the Work Place Guide and Work Place Instructions, and assemble the bin for Work Place 4C, using the materials listed on the guide. The Work Place Guide also includes suggestions for differentiating the game to meet students' needs.
- You will need two copies of the 4C Target One Thousand Record Sheet for use in introducing the game to the class today, one for yourself, and one for the students.
- Write a list of Work Places from which students can choose today. You can just write the numbers (3B–4C) or write out the full names if you prefer. (See the Work Places in Use row of the Materials Chart for the complete list of Work Places in use today.)
- Read Session 4 to see how students might share their work from today's session. Before tomorrow's forum, use the Bird Measurement Problems Forum Planner to help select students to share their work.



Work Places

Introducing Work Place 4C Target One Thousand

- 1 Set the stage for today's activities by letting students know that you will introduce a new Work Place game first. Then the students will work on some measurement story problems and go to Work Places if they still have time.
- 2 Draw students' attention to the class Addition and Subtraction Strategies charts. Explain that these some of these strategies may be very useful in the game you will introduce today—Target One Thousand—as you pass out scratch paper.
- 3 Introduce the game Target One Thousand.
 - Display the 4C Target One Thousand Record Sheet Teacher Master where everyone can see it.
 - Explain that the game will give students another opportunity to practice adding and subtracting 3-digit numbers.
- 4 Briefly summarize the game before playing against the class.

Players take turns drawing 8 Number Cards, and then each chooses 6 of these cards to make two 3-digit numbers with a sum as close to 1,000 as possible (over or under). Each player finds the exact difference between their sum and 1,000. After 3 rounds, each player adds their differences, and the player with the lower total wins. Since working with so many digits and possibilities requires a great deal of time and experimentation, there are only three rounds in each game.
- 5 Play a round or two of Target One Thousand against the class, using two copies of the 4C Target One Thousand Record Sheet. Use your copy of the Work Place Instructions as needed.

Teacher This game is very similar to Target One Hundred, except that this time, we arrange 6 cards to form two 3-digit numbers that sum to as close to 1,000 as possible.

- While you play, review the following points:
 - » The sum can be less than or greater than 1,000. The goal is to get as close to 1,000 as possible.
 - » The player with the lower score at the end of the game wins.
- 6 As you play the game with the class, pose questions like the following to promote flexible thinking and strategy development:
- Which is a better score, higher or lower?
 - What strategies can you use to choose 6 cards out of the 8 that will make numbers with a sum as close to 1,000 as possible?
- 7 After playing a round or two, ask students to turn to a partner to summarize the directions for Target One Thousand.
- Let students know that the game will be available for use during Work Places today and for a few weeks to come.



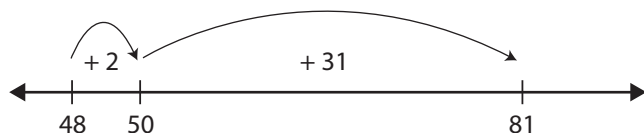
Math Practices in Action 3.MP.1

Games give students a wonderful opportunity to make sense of problems and persevere in solving them. In Target One Thousand, students perform many calculations, but the game itself is the broader problem, which students make sense of by clarifying the objective and developing strategies for winning. Students have many chances to play the game, which gives them the opportunity to persist in their efforts while becoming more fluent with estimation and computation.

Problems & Investigations

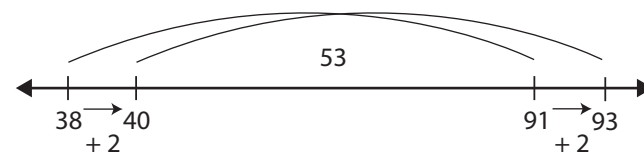
Measurement Story Problems

- 8 Let students know that over the next several days, they will work on a variety of story problems in which they will have to figure out what operation to use and decide what strategies will be the most effective.
- 9 Then, display your copies of the Bird Measurement Problems Student Book pages, and have students find the pages in their books.
- Give students a minute or two to examine the problems and share observations and questions, first in pairs and then as a whole class.
 - Note with students that the problems require different operations. Remind them that drawing a picture or figuring out which model to use may help them decide which operation to use and provide insights about how to solve a problem.
- Students All of these problems are about measurement—mass and time. There’s some stuff about volume on the next page. It seems like they are all different kinds of problems. We have to add in the first one but the second one is a subtraction problem. And we have to multiply for the ones at the end.*
- Teacher That’s right. Part of your job will be to figure out which operation to use. A really good way to do that is to think about what model you would use to solve the problem.*
- 10 Before they start work, draw students’ attention to the Addition and Subtraction Strategies charts you posted in preparation for this session. Can they spot any strategy that looks like it might be particularly helpful with one or more of the measurement problems?
- Remind students that they used jumps on the open number line to solve problems about time just a few sessions ago.
 - Take a few minutes to quickly review the compensation strategy for addition and the constant difference strategy for subtraction, as these may be especially helpful given some of the combinations students will be working with.

Compensation (Give & Take) Strategy for Addition

$$48 + 33 = 81$$

$$\begin{array}{r} 48 + 33 \\ +2 \quad -2 \\ \hline 50 + 31 = 81 \end{array}$$

Constant Difference Strategy for Subtraction

$$91 - 38 = 53$$

$$\begin{array}{r} 91 - 38 \\ +2 \quad +2 \\ \hline 93 - 40 = 53 \end{array}$$

- 11 Let the students know that they will have about 30 minutes to work on the problems.
- Encourage them to use the strategies that are the most efficient and sophisticated for them at this time.
 - Remind students to show their work clearly. Tell them that someone should be able to understand how they solved the problem just by looking at their work.
 - Tell students that they will share their strategies and discoveries in a math forum next session.

- 12 When students understand what to do, have them go to work, either independently or in pairs.

As they work, circulate around the room and use your copy of the Bird Measurement Problems Forum Planner to make notes about who you'll have share in tomorrow's math forum.

- Take time to confer with students as necessary, especially those in need of support or challenge.
- As you visit with students, help them think about which model they might use to solve the problem. This often helps them figure out what operation to use as well as which strategy to try.

You'll notice that the Forum Planner for this session and next is quite different from those you've seen and used so far. Up until this point, forums have generally been structured so that the strategies shared by students build on each other and increase in sophistication. The discussion during tomorrow's forum will center on choice of models and operations rather use of specific strategies, however. In selecting students to share their work, look for individuals who will be able to describe the steps they took to solve a problem, and explain why they chose a particular model or strategy.

- 13 As students finish the assignment, have them share and compare strategies and solutions with at least one other classmate.

If students arrived at different answers for one or more of the problems, encourage them to rework the problem together, and/or consult with a third student.

SUPPORT While you might reasonably expect some, perhaps many, of your students to complete the first 7 problems on this assignment within 30 minutes, others may need additional time. You might also consider varying your expectations. For some students, completing the first 5 problems in a thorough and careful manner might be more productive than working the entire set.

CHALLENGE Encourage students who are working quickly and easily to tackle the last problem on the second sheet.

- 14 If enough time remains in the session, have students who complete the assignment pick up their folders and pencils and find a Work Place to do.
- 15 Close the lesson by having students give you a thumbs up, thumbs down, or thumbs in the middle to show you how they felt about the Measurement Story Problems.
 - Let them know they will share their work in a forum in the next session.
 - Then, have them clean up and put away materials.

Note

You might want to collect students' journals at the end of the session so you can look at their work more carefully and think back on the conversations you had with some of them as you make decisions about who you'll have share in the math forum next session.



Daily Practice

The optional Mr. Measure Student Book page provides additional opportunities to apply the following skills:

- Solve story problems involving addition of time intervals in minutes (3.MD.1)
- Solve story problems involving addition of volume measurements given in liters (3.MD.2)
- Solve story problems involving subtraction of mass measurements given in grams (3.MD.2)

Preview

Session 4

More Measurement Problems

Summary

This session begins with a math forum in which students share their work from Session 3. With the teacher's guidance, the discussion centers around selecting and using the correct operation, as well as choosing effective models and strategies. After the forum, students work in pairs on measuring story problems that require more than one step and one operation to solve. Finally, the teacher introduces and assigns the Grasshopper Math Home Connection.

Skills & Concepts

- Solve two-step story problems using addition, subtraction, and/or multiplication (3.OA.8)
- Use strategies based on place value, properties of the operation, or the relationship between addition and subtraction to fluently subtract with minuends to 1,000 (3.NBT.2)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)
- Solve story problems involving subtraction of volume measurements or involving addition, subtraction, or multiplication of mass measurements given in grams (3.MD.2)
- Make sense of problems and persevere in solving them (3.MP.1)
- Construct viable arguments and critique the reasoning of others (3.MP.3)

Materials

Copies	Kit Materials	Classroom Materials
Math Forum Measurement Problems		
		<ul style="list-style-type: none"> • Bird Measurement Problems Student Book page (completed during Session 3) • Bird Measurement Problems Forum Planner (with notes from Session 3) • chart paper
Problems & Investigations More Measurement Problems		
TM T8 More Measurement Problems Forum Planner SB 124–125 More Measurement Problems		
Home Connection		
HC 69–70 Grasshopper Math		
Daily Practice		
SB 126 Millie Millipede		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
 Copy instructions are located at the top of each teacher master.

Preparation

- Use the Bird Measurement Problems Forum Planner to decide which four or five students you want to have share in today's forum and in what order.
- Post one or more pieces of chart paper where everyone can see them during the math forum.
- Students will work on today's assignment with a partner, and in this case, you'll probably want to pre-assign the partners.
- Read Session 5 to learn about tomorrow's math forum. Before tomorrow's forum, use the More Measurement Problems Forum Planner to help select students to share their work.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

gram (g)*
 kilogram (kg)*
 milliliter (ml)*
 pan balance scale



Math Forum

Measurement Problems

- 1 Open today's session by letting students know that they will share their work in a math forum and then work in pairs to solve some more measurement problems that feature a different kind of challenge.
- 2 Have students open their books to the Bird Measurement Problems assignment from the previous session. Give them a minute to review the problems and re-examine their own work. Then begin the forum.
- 3 Invite the students you selected to present their work, one student or student pair at a time.
 - Have presenting students tell the class which problem they are going to talk about and how they figured out how to solve it. Have students explain which model they chose to use and how that helped them solve the problem. Then, they can briefly share how they actually solved it, unless the class needs help with the strategy, in which case the explanation can be longer.
 - As students share, record their thinking on sheets of chart paper, using sketches, number lines, and equations as appropriate. Your aim should be to clarify students' thinking and make it visible to everyone.
 - Invite the rest of the class to ask questions, and have the presenters respond to those questions.
 - After each student finishes, ask the class to summarize how that individual selected the model and operation to use.

Note The vignette below typifies the kinds of challenges third graders encounter in solving story problems, and some of the ways in which they work toward solutions. In this scene from a classroom, you will also find the kinds of questions, prompts and comments that can be used to draw out students' thinking and support them in their efforts.

Sample Dialog: Understanding the Problem and Choosing a Model

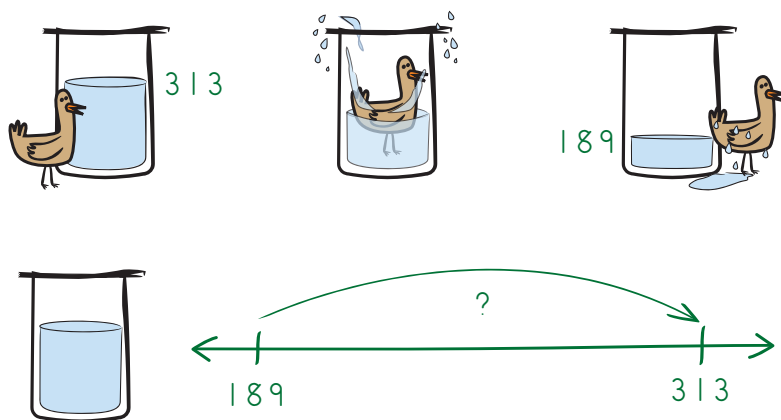
Teacher Yesterday, you worked hard to figure out what the questions were asking and what models would help you solve the problems. In our forum today, I'd like you to focus on how you figured out how to solve the problem. Share with us what model you chose and why. Let's hear from you first, Jamar.

Jamar I was working on number 5, where Ted jumped into the beaker of water. At first, I was really confused because I didn't know what the problem was asking. So, Mr. Gonzalez helped me draw some pictures about the problem. First, we drew a beaker with 313 milliliters of water. Then we drew a beaker with Ted jumping in and water splashing out. Then we drew a beaker with 189 milliliters of water in it. That helped me see that there was less water at the end than at the beginning. Then, I knew that question was asking about the water that splashed out. Then, Mr. G told me that a beaker is kind of like one of our measuring cups, with lines up the side. That made me think of using a number line. So, then I drew a number line and found out how far it was between 189 and 313. It was 124. So, 124 milliliters of water splashed out when Ted jumped in.



Math Practices in Action 3.MP.5

Tools are not only measuring devices, technological applications, manipulatives, and the like. Mathematical models and computational strategies are also tools. By inviting students to explicitly discuss their selection of models and strategies, you are helping them become better able to use appropriate tools strategically.



Teacher Does anyone have any questions?

Sheela How did you find the 124?

Jamar I jumped from 189 to 200. That was 11. Then, I jumped up 100 more to 300. Then, it was just 13 more to 313. So, 11 and 100 and 13 together are 124.

Connor Why did you choose the number line?

Jamar Because I knew I had to find out how much the water level went down. That made it a subtraction problem and I've solved subtraction problems like that on the number line before. The measurements on the beaker made me think of a number line too.

Teacher Thank you for a clear explanation of how you figured out what the problem was asking and how you answered it. Can you all turn to the person next to you and talk about the model Jamar used and why he used it?

- 4 When the 4 or 5 students you selected have shared their work, wrap up today's forum.

Let students know that they are about to use the skills and processes they just shared in tackling some new problem-solving challenges, and you will again invite some of them to share their work in a second forum next session.



Problems & Investigations

More Measurement Problems

- 5 Display your copies of the More Measurement Problems Student Book pages, and have students find the pages in their books.
- Give students a minute or two to examine the problems and share observations and questions, first in pairs and then as a whole class.
 - Explain that they will continue to solve problems by thinking about which operations and models to use. Then, ask students what is different about these problems and build a discussion around solving multi-step problems.

George Wait, these are harder than the problems we did yesterday.

Teacher What makes them harder?

George It's harder to figure out what to do. In yesterday's problems, we just had to figure out if the problem was about multiplication or subtraction or whatever and then solve it. I'm not sure what to do here.

Neesha It's like there are two problems in one.

Teacher Can you say more about that?

Neesha OK. Look at number 2. First you have to figure out how much mass the puppies have together. That's one problem. Then, you have to figure out how much mass the mother has. Her mass is 5 times the mass of one puppy so that is 5 times 3, which is 15 kilograms. That's another problem. And then you are still not done, because the problem wants to know how much mass all of the dogs have together! So then you add the mass of puppies and the mother together.

Teacher Wow, you really broke that problem down for us. Did everyone hear how Neesha figured out and solved each step of the problem so she could answer the final question? These problems are a lot more complicated than the ones we have been doing lately. They have a lot of steps. When you do these problems, it is really important to figure out what the steps are and how to solve each one.

Adam It's like a puzzle. You have to solve other problems to be able to answer the question.

- 6 Invite a student to read problem 3 aloud. Then, ask the class what the question is asking and what they need to figure out to be able to answer the question.

SUPPORT It may help to have students find the “hidden” questions. Have them figure out what problem(s) they need to solve in order to answer the question.

Teacher So, what is this question asking?

Jack How much water is left in the dish.

Teacher What do you need to do to find out how much water is left?

Bea I don't know.

Teacher What do you know?

Bea I know that there was 23 milliliters and then there was 4 times 23 milliliters.

Teacher What does that tell you?

Briana How much water is in the bowl. So, we need to multiply 4 times 23.

Teacher And, then what would you do?

Briana Then, you know how much water was in the bowl so you can subtract the 39 milliliters from that. You don't know that in the beginning so you have to figure that out before you can subtract.

Teacher So you are going to multiply and then subtract—two different operations. Great thinking! Does anyone have a question about this? Does anyone have a suggestion that would help us solve these problems?

Students Figure out what's missing and solve that.

Stick with the problem until you can answer the question at the end.

- 7 Ask students if they have any questions or concerns about these problems. Let them know you will be available to help as they work.
- 8 Assign partners and have students spend the rest of the session working on the assignment.
- Encourage students to think about which models to use to help solve the problems and remind them to show their work clearly.

- Depending on the amount of time remaining in the session, you might consider asking students to choose two or three of the five problems to work very carefully and thoroughly, rather than operating with the expectation that they'll solve all of them.

9 As students work, circulate to observe, talk with individuals and pairs, and provide differentiation as needed.

Use your copy of the More Measurement Problems Forum Planner to make notes about which pairs you'll have share in tomorrow's math forum.

SUPPORT If you notice a number of students struggling with these problems, you may want to pull them into a group and work together to figure out what they need to do to figure out how to solve each problem, as modeled in the dialog after s8step 6.

SUPPORT As you confer with students, watch to see what models they are choosing. Look to see if they are using the correct operation. Gathering these pieces of information will help you understand how best to support students as they're working. Do they need help interpreting the question? Can they figure out which model to use? Do they need help knowing which operation to use?

SUPPORT Look to see how students are handling problem 5. In particular, watch how they use the number lines to model and solve situations that involve the passage of time. Look for common mistakes such as forgetting that an hour has 60 minutes and not 100, having trouble adding time past 12:00 noon accurately, or keeping track of hours and minutes as they add. Use these observations to help guide your interactions with students.

CHALLENGE Invite students who are able to work these problems easily and accurately to write one or more equations, including a letter for the unknown, to represent each problem.

10 Close the session.

- Have students share, first in pairs and then as a whole class, their thoughts and responses to the following:
 - » What are some of the things that are the most challenging about two-step story problems?
 - » What are some of the things you can do to understand and solve problems that involve more than one step?
- Let students know they will share their work in another math forum next session.

Note

You might want to collect students' books at the end of the session so you can look at their work more carefully and think back on the conversations you had with some of them as you make decisions about who you'll have share in the Math Forum next session.



Home Connection

11 Introduce and assign the Grasshopper Math Home Connection, which provides more practice with the following skills:

- Solve two-step story problems using addition, subtraction, and multiplication or division (3.OA.8)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)
- Solve story problems involving addition and subtraction of volume measurements (3.MD.2)
- Solve story problems involving addition, subtraction, or multiplication of mass measurements given in grams (3.MD.2)
- Solve story problems that involve finding the perimeter of a polygon, given its side lengths (3.MD.8)



Daily Practice

The optional Millie Millipede Student Book page provides additional opportunities to apply the following skills:

- Solve two-step story problems using addition, subtraction, and/or multiplication (3.OA.8)
- Solve story problems involving addition and subtraction of volume measurements (3.MD.2)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)

Preview

Session 5

Multi-Step Measurement Problems Forum

Summary

Students share their work with multi-step measurement problems in a math forum. Then they spend the remainder of the session in Work Places. The teacher pulls small groups of students to provide differentiated instruction as needed.

Skills & Concepts

- Solve two-step story problems using addition, subtraction, and/or multiplication (3.OA.8)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)
- Solve story problems involving subtraction of volume measurements given in liters (3.MD.2)
- Solve story problems involving addition, subtraction, or multiplication of mass measurements given in grams (3.MD.2)
- Make sense of problems and persevere in solving them (3.MP.1)
- Reason abstractly and quantitatively (3.MP.2)

Materials

Copies	Kit Materials	Classroom Materials
Math Forum More Measurement Problems		
		<ul style="list-style-type: none"> • More Measurement Problems Student Book page (completed during Session 3) • More Measurement Problems Forum Planner (with notes from Session 3) • chart paper
Work Places in Use		
3B Add & Round Tens (introduced in Unit 3, Module 1, Session 3) 3C Round Ball Hundreds (introduced in Unit 3, Module 1, Session 4) 3D Round & Add Hundreds (introduced in Unit 3, Module 3, Session 1) 4A Tic-Tac-Tock (introduced in Unit 4, Module 1, Session 2) 4B Measurement Scavenger Hunt (introduced in Unit 4, Module 2, Session 2) 4C Target One Thousand (introduced in Unit 4, Module 2, Session 3)		
Daily Practice		
SB 127 Arnie Orangutan		

HC – Home Connection, **SB** – Student Book, **TM** – Teacher Master
 Copy instructions are located at the top of each teacher master.

Preparation

- Use the More Measurement Problems Forum Planner to decide which four or five students you want have to share in today's forum and in what order.
- Post one or more pieces of chart paper where everyone can see them during the math forum.
- Write a list of Work Places from which students can choose today. You can just write the numbers (3B–4C) or write out the full names if you prefer. (See the Work Places in Use row of the Materials Chart for the complete list of Work Places in use today.)
- During Work Places you will have a chance to work with students in small groups. Think about students who would benefit from small group instruction on skills and concepts addressed recently. You may want to use some of the problems that have appeared in Daily Practice pages over the past couple of weeks to help focus your time with these students.

Vocabulary

An asterisk [*] identifies those terms for which Word Resource Cards are available.

gram (g)*
 kilogram (kg)*
 milliliter (ml)*
 pan balance scale



Math Forum

More Measurement Problems

- 1 Open today's session by letting students know that they will share their work in another math forum and then spend the rest of the lesson visiting Work Places.
- 2 Have students open their books to the More Measurement Problems assignment from the previous session. Give them a minute to review the problems and re-examine their own work. Then begin the forum.
- 3 Then, begin the forum.
 - Invite students to share, one pair at a time.
 - Have each pair tell the class which problem they are going to talk about, what the problem was asking, and what they had to do to be able to answer the question. Have them talk about the “hidden” questions that they had to solve and have them share the models they used to solve each part of the problem.
 - As students share, record their thinking on sheets of chart paper, using sketches, number lines, and equations as appropriate. Your aim should be to clarify students' thinking and make it visible to everyone.
 - Invite the rest of the class to ask questions, and have the presenters respond to those questions.
 - After each student pair finishes, ask the class to summarize the steps they took to solve the problem.

Note The two vignettes below reflect some of the ways in which third graders typically find their way into and solve problems that require more than one step and more than one operation.

Scene 1: Unraveling the Mystery of Multi-Step Problems

Emilio We're going to talk about number 4. This problem asks how tall Abby is when she is wearing shoes that are 6 centimeters tall.

Henry At first, we had no idea how to solve the problem.

Emilio Then, we looked for the hidden problem. In the beginning it says, Abby is 4 times taller than her dog and her dog is 51 centimeters tall.

Henry So we had to figure out how tall Abby is. We knew we could figure out how tall she is if we multiplied Gabi's height by 4. At first 51 times 4 seemed hard, but then we realized it was the same as 50×4 , which is 200, and then 1×4 , so the answer was 204.

Emilio So then we knew that she was 204 centimeters tall. Then we just had to add the 6 centimeters from her shoes. 204 plus 6 is 210. That was easy because it was like a Make Ten fact. Abby is 210 centimeters tall when she is wearing her shoes.

Henry At first it seemed really hard, but when we took the problem apart, it was not so hard after all.

Teacher That was a nice example of explaining what the problem is asking and what steps you had to do to solve the problem. Can everyone turn to the person next to you and summarize what they did to solve this problem? Make sure you talk about the models they used as well.

Scene 2: Using Pictures to Help Solve a Multi-Step Problem

Julia In the beginning, we were really confused and thought we couldn't solve any of these problems. They were so hard to figure out. Then, we started trying to draw pictures about the problems.

Maddy In the first one, before we even knew what to do, we drew a picture of a pan balance scale with 5 lizards on it. We knew that was 234 grams.

Julia Then, we erased one lizard because in the problem, one got off. Then we drew another lizard on the scale because the problem said another one got on. But then we were confused because we didn't know how much mass these lizards had.

Maddy So, we went back and erased the new lizard. We knew that the first lizard had a mass of 25 grams. Then, we realized we had to subtract 25 from 234 because when that first lizard got off, there would be less mass.

Julia So, we used a number line to jump back 25 from 234. We landed at 209.

Maddy Then we went back to our picture and added the other lizard. This lizard had a mass of 43 grams. Then there was more mass on the scale so we had to add 43 grams to 209 to show the mass of these 5 lizards.

Julia We used the same number line and jumped up 43 from 209. We landed at 252. That's how we got that the lizards had a mass of 252 grams.

Teacher Did anyone else use pictures to help make sense of the problems? How did the pictures help these two solve the problems? Talk about that with a partner.

Teacher What are the hidden questions in this problem?

Thomas Five lizards have a mass of 234 grams. A lizard with a mass of 25 grams gets off the pan balance scale. How much mass do the 4 lizards have?

Treena Another lizard with a mass of 43 grams gets on the pan balance scale. How much mass do the 5 lizards have now?

Teacher Very nicely said. What models did Julia and Maddy use to solve these hidden questions?

- 4 When the pairs you selected have shared their work, wrap up today's forum by asking students to reflect on their work.

Teacher You have been working on some really hard problems lately. First you had to figure out what a problem was asking. Then, you needed to figure out what other questions you had to answer in order to solve the problem. Then, you had to figure out the answers to those questions, and use the information to solve the main problem. That is a lot of work! You are a pretty capable mathematician if you can solve these problems.

Ask the students to think quietly about how they feel about solving these multi-step problems. Then invite a few students to share their thoughts with the class.



Work Places

- 5 Invite students to spend the remainder of the session at Work Places.
Have students pick up their Work Place folders and a pencil and remind them to fill out their Work Place logs as they finish each game or activity.
SUPPORT Suggest specific Work Places for struggling students to work on critical skills.
CHALLENGE Encourage students to think about the strategies they are using and share their thinking. Encourage students to generalize what happens in certain Work Places.
- 6 Close today's session by acknowledging students' perseverance in solving problems. This is an important characteristic of mathematicians.

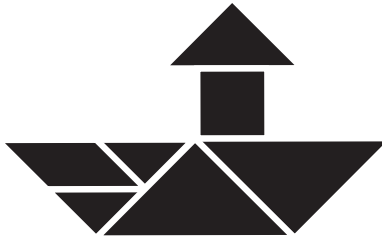


Daily Practice

The optional Arnie Orangutan Student Book page provides additional opportunities to apply the following skills:

- Solve two-step story problems using addition, subtraction, multiplication and /or division (3.OA.8)
- Solve story problems involving subtraction of volume measurements given in liters (3.MD.2)
- Solve story problems involving subtraction and division of mass measurements given in kilograms (3.MD.2)
- Solve story problems involving addition of time intervals in minutes (3.MD.1)

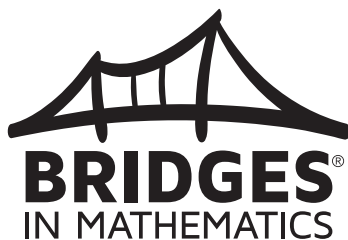
Preview



Teacher Masters

GRADE 3 – UNIT 4 – MODULE 2

Preview



NAME _____

DATE _____



Time Checkpoint

- 1 What time is it? Fill in the digital clock with the time you see on the analog clock.

<p>a</p>	<p>b</p>
-----------------	-----------------

- 2 What time is it? Fill in the analog clock with the time you see on the digital clock.

<p>a</p>	<p>b</p>
-----------------	-----------------

- 3 Jane is making cookies. It takes her 5 minutes to get out all the ingredients, 10 minutes to mix them all together, 3 minutes to put cookie dough on the pan, and then 12 minutes to bake the cookies. Use this information to solve both problems below. Show your work using numbers, sketches, or words.

- a** How long does it take Jane to make the cookies, from start to finish?
- b** Jane finished making the cookies at 4:30 p.m. What time did she start?



Work Place Guide 4B Measurement Scavenger Hunt

Summary

Players work together to make, pour, or find certain measurements. They spin two spinners—a measurement spinner and a quantity spinner. The spinners indicate the type of measurement (mass, volume, or length) and the quantity (100, 250, 500, or 750 grams, milliliters, or millimeters). If they spin mass, they will work with clay. If they spin volume, they will work with water. If they spin length, they will search for classroom objects of certain lengths. Players try to mold, pour, or search for an object that matches the amount they spun on the quantity spinner. Then they find the actual mass, volume, or length of the clay, water, or object to see how close they came, and record the results on their record sheets. They repeat these steps until they have completed their record sheets.

Note

Find a location in your classroom, such as a long table or several desks in an out-of-the way place, where you can set up and leave out three or four measuring stations, each equipped with one set of the materials listed below, for use by one pair of students. You might want to place each set of materials on a cafeteria tray to keep them together and to deal with possible spills or leaks.

Skills & Concepts

- Estimate and measure liquid volume in liters and milliliters; estimate and measure mass in grams and kilograms (3.MD.2)

Materials

Copies	Kit Materials	Classroom Materials
TM T2 Work Place Guide 4B Measurement Scavenger Hunt TM T3 4B Measurement Scavenger Hunt Record Sheet SB 118 Work Place Instructions 4B Measurement Scavenger Hunt	<ul style="list-style-type: none"> 3–4 spinner overlays 3–4 measuring tapes marked in millimeters 3–4 one-liter measuring cups 	<ul style="list-style-type: none"> 3–4 pan balance scales modeling clay, about 6–8 pounds, divided into 3 or 4 equal amounts 3–4 pitchers or other containers with pour spouts that each hold about a liter of water 3–4 dish towels or several paper towels

Assessment & Differentiation

Here are some quick observational assessments you can make as students begin to play this game on their own. Use the results to differentiate as needed.

If you see that...	Differentiate	Example
Students are having a hard time using the pan balances.	SUPPORT Using just the metric weights, help students practice balancing the scale. Then have them find an approximate mass of a few classroom items such as scissors, glue, or a box of crayons by placing the item on one side of the scale and placing metric weights, one at a time, on the other side until the scale is balanced.	Students try and try but cannot make the two sides of the scale balance. Encourage them to slow down and place a classroom object on one side of the pan balance. Then have them work with the metric weights until the scale balances. Have them repeat several times.
Students are making balls of clay or pouring quantities of water that are not at all close to the desired amount.	SUPPORT Encourage students to keep trying and to use their guesses to help them refine new attempts. Have them make several clay balls of different sizes and then find the approximate mass of each one, using the metric weights. This will help them get a sense of how much clay to use. Or, have them pour different amounts of water into several containers, and then measure the amount of water in each to get a better sense of how much they'd need to approximate 100 or 250 milliliters.	Ask them questions such as: "Your clay has too much mass; what should you do? About how much do you need to take off?" "Your clay doesn't have enough mass; what should you do? About how much do you need to add?" "Do you have too much water or not enough? What can you do to change the volume?"
Students understand how to use a pan balance and are skilled at estimating and matching different masses and volumes.	CHALLENGE Change the amounts on the quantity spinner to 150, 300, 450, and 850 and have students try to form balls of clay, pour water, or find objects around the room to match these new amounts. You can also have students determine the mass of other objects in the classroom.	
English-Language Learners Use the following adaptations to support the ELL students in your classroom.		
<ul style="list-style-type: none"> Work with ELL students in a small group. Model what to do with each step of the activity. Observe and support students as they try each step. Ask students for some of the key words in their own languages and write them on their record sheets. 		

NAME _____

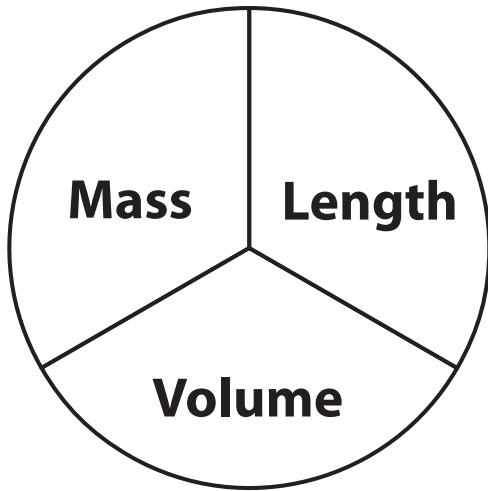
DATE _____



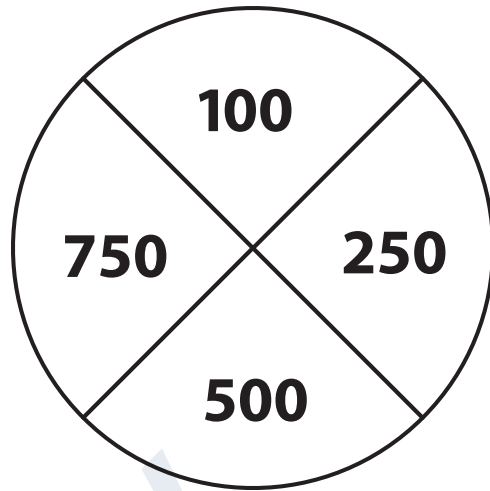
4B Measurement Scavenger Hunt Record Sheet

Player 1 _____

Player 2 _____



Measurement Spinner



Quantity Spinner

Fill out the chart as you do the Measurement Scavenger Hunt.

What did you spin on the Measurement Spinner?	What did you spin on the quantity spinner?	Circle the units you'll need to use for this measurement.	Was your estimate greater than or less than the number you spun?	How would you change your guess?
ex Mass	500	grams milliliters millimeters	greater than	I would take off some clay and try again.
1		grams milliliters millimeters		
2		grams milliliters millimeters		
3		grams milliliters millimeters		
4		grams milliliters millimeters		
5		grams milliliters millimeters		

NAME _____

DATE _____



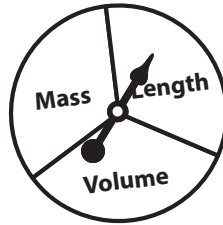
Unit 4 Work Place Log

4A Tic-Tac-Tock



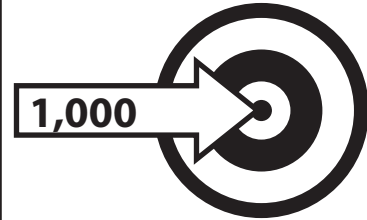
Student Book 104

4B Measurement Scavenger Hunt



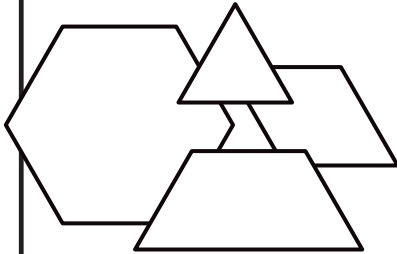
Student Book 118

4C Target One Thousand



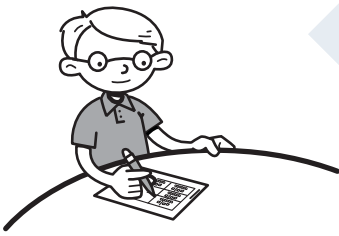
Student Book 120

4D Hexagon Spin & Fill

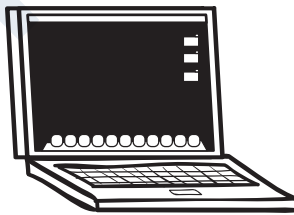


Student Book 131

Personal Practice



Computer Activity



Work with the Teacher





Work Place Guide 4C Target One Thousand

Summary

Each player draws 8 Number Cards and chooses 6 of them to make two 3-digit numbers with a sum as close to 1,000 as possible (over or under). Each player finds the exact difference between their sum and 1,000. After 3 rounds, each player adds their differences, and the player with the lower total wins. Note: Since working with so many digits and possibilities requires a great deal of time and experimentation, there are only three rounds in each game.

Skills & Concepts

- Fluently add and subtract with sums and minuends to 1,000 using strategies based on place value (3.NBT.2)

Materials

Copies	Kit Materials	Classroom Materials
TM T5 Work Place Guide 4C Target One Thousand TM T6 4C Target One Thousand Record Sheet SB 120 Work Place Instructions 4C Target One Thousand	<ul style="list-style-type: none"> 3 decks of Number Cards 	<ul style="list-style-type: none"> scratch paper

Assessment & Differentiation

If you see that...	Differentiate	Example
Students are having a real difficulty with 3-digit addition.	SUPPORT. These students can play extra games of Target One Hundred instead and try Target One Thousand again in a few weeks when their confidence with adding and subtracting multi-digit numbers has increased. You might also give them a few 3-digit addition problems that are not very hard ($400 + 325$, $275 + 301$) as well as reviewing strategies for adding 3-digit numbers.	
Students are choosing any 6 numbers and arranging them without considering the outcome.	SUPPORT. Have students rearrange the 6 digits several different ways, and discuss with them the resulting sums and scores. Ask questions to help students understand the purpose in arranging the cards so they create a sum that is close to 1,000.	"When you arrange your cards, there are a lot of different numbers you can make. That means there will be different sums that you can make. Do you think some of the sums will be closer to 1,000 than others? Let's try a few."
Students are having a hard time choosing and arranging cards to make 3-digit numbers that sum close to 1,000.	SUPPORT. Encourage students to choose only 6 cards each, make two 3-digit numbers with those cards, and just concentrate on the addition. Later, you can encourage them to think more about their choices of digits and how they are arranged.	
Students are having a difficult time finding the score.	SUPPORT. Draw an open number line and place 1,000 on it in the middle. Ask the student to place the score in relation to the 1,000. Help the student make jumps on the number line (getting to a friendly number or adding friendly numbers) and sum the jumps.	For example, if their score is 972, have the student place 972 to the left of 1,000. Ask the student, "How close is 972 to the target of 1,000?"
Students can add 3-digit numbers with efficient strategies.	CHALLENGE. Ask students to analyze the numbers they made. What other 3-digit numbers could they make? Are there other 3-digit numbers that might get them closer to 1,000? You might also invite these students to try Game Variation B, Target Ten Thousand.	
Students are quickly and easily making 3-digit numbers that add to amounts close to 1,000, adding with efficient strategies, and easily determining the score.	CHALLENGE. Game Variation C, using the wild cards, will allow number combinations that come very close to 1,000. After students have played several times with wild cards, ask them questions about using wild cards.	"If you have one wild card, can you always get a perfect score of zero? Two wild cards? Three, four, or five wild cards?"

English-Language Learners Use the following adaptations to support the ELL students in your classroom.

- Have ELL students observe other students playing the game before playing it themselves.
- Pair each ELL student with a supportive partner (an English-speaking student or another ELL student with more command of English) who can offer support and explain the instructions while they play.
- Play the game with the ELL students yourself. Model how to play and put emphasis on how to select cards to compose 3-digit numbers to add up. Make sure students understand that they have a choice and that they understand the goal of getting close to 1,000.
- Once students are playing the game with understanding, try to get them to verbalize and demonstrate their strategies. What is helping them as they make and add 3-digit numbers? How are they doing to get as close to 1,000 as they can?

NAME _____

DATE _____

**4C Target One Thousand Record Sheet**

For each round of the game, players write an addition equation, their score, and their partner's score.

First Game		Sum	Score	Partner's Score
1	_____ + _____ =			
2	_____ + _____ =			
3	_____ + _____ =			
My Final Score _____		My Partner's Final Score _____		

Second Game		Sum	Score	Partner's Score
1	_____ + _____ =			
2	_____ + _____ =			
3	_____ + _____ =			
My Final Score _____		My Partner's Final Score _____		

Third Game		Sum	Score	Partner's Score
1	_____ + _____ =			
2	_____ + _____ =			
3	_____ + _____ =			
My Final Score _____		My Partner's Final Score _____		



Bird Measurement Problems Forum Planner

Use this planner to take notes as students are working the problems in Session 3 and to help make decisions about which individuals to have share their work in Session 4.

Note Up until this point, forums have generally been structured so that the strategies shared by students build on each other and increase in sophistication. This time, the discussion will center on choice of models and operations rather use of specific strategies. In selecting students to share their work, you'll want to find individuals who will be able to describe the process they went through to choose a model and a strategy.

Student	Notes/Comments



More Measurement Problems Forum Planner

Use this planner to take notes as students are working the problems in Session 4 and to help make decisions about which pairs to have share their work in Session 5.

Note Up until this point, forums have generally been structured so that the strategies shared by students build on each other and increase in sophistication. This time, the discussion will center on choice of models and operations rather use of specific strategies. In selecting students to share their work, you'll want to find pairs who will be able to describe the process they went through to solve the two or more steps required to complete the problem.

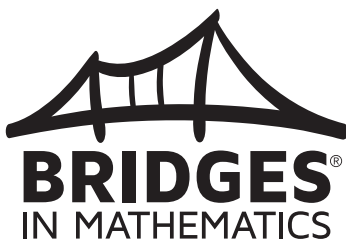
Student Pair	Notes/Comments



Student Book

GRADE 3 – UNIT 4 – MODULE 2

Preview





Which Container Is Best? page 1 of 2

For each problem below:

- Estimate and record which containers you think will hold the amount of water needed. (It's OK if you choose more than one container that might work.)
- Test your estimates using your liquid measuring cups.
- Decide which beverage container actually works best.
- Record your recommendation.

Sarah needs to bring some water for several different activities this week. Help her choose the best container for each activity.

- 1 For a car trip to her grandma's on Monday, Sarah needs to bring about 500 milliliters of water to drink.
 - a Estimate: Which of the containers look like they would hold about 500 milliliters?
 - b Container _____ holds about 500 milliliters.
- 2 For her track meet on Saturday, Sarah needs to bring about a liter of water to drink.
 - a Estimate: Which of the containers look like they would hold about 1 liter? Are there any combinations of two or more containers that might hold 1 liter?
 - b Container(s) _____ hold(s) about 1 liter.
- 3 For ballet class on Wednesday, Sarah needs to bring about 800 milliliters of water to drink.
 - a Estimate: Which of the containers look like they would hold about 800 milliliters? Are there any two containers that look like they would hold 800 milliliters combined?
 - b Container(s) _____ hold(s) about 800 milliliters.

(continued on next page)

Which Container Is Best? page 2 of 2**Last Month**

- 4** On the way home from each track meet last month, Sarah bought a 2-liter bottle of juice. How many total milliliters of juice did she drink if there were 6 track meets last month? Show your work.
- 5** Last week Sarah made punch for her friends. The recipe called for 200 milliliters of orange juice, 300 milliliters of cranberry juice, and half a liter of sparkling cider to make enough punch for 4 people. Sarah had 8 people at the party. How much punch did she make? Show your work.
- 6** Two weeks ago, Sarah bought a container of milk that held 2 liters. She drank a 250-milliliter glass of milk every day. How many days did it take her to use the entire container of milk? Show your work.
- 7** Sarah had a cold last month, so she took 5 milliliters of cough syrup every day. Her bottle of cough syrup held 75 milliliters. How many times could she take the cough syrup before the bottle was empty? Show your work.

NAME _____

DATE _____



Liquid Volume

There are 1,000 milliliters in 1 liter. Use this information to help solve the problems below. Show your work for each problem.

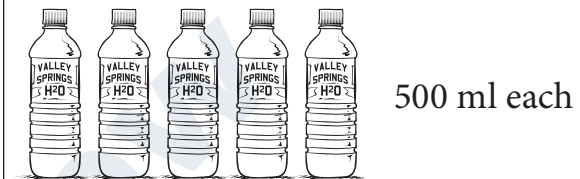
- 1 a** John's bucket of water has 5 liters. How many milliliters is that?



- b** John poured 2 liters of water out of his bucket. How many milliliters does he have left in the bucket?



- 2** Ramona has a juice bottle that has $1\frac{1}{2}$ liters. How many milliliters is that?



- 3** Sarina was measuring out some milk. She wanted exactly 1 liter of milk. So far, she has 300 milliliters. How many more milliliters does she need to get exactly 1 liter of milk?

- 5** Suki drank $4\frac{1}{2}$ liters of liquid today. Look at the table above and decide which items she drank. (Hint there is more than one correct answer.)

- 4** One small bottle of shampoo holds about 50 milliliters. How many bottles of this size would it take to make 1 liter?



Work Place Instructions 4B Measurement Scavenger Hunt

Each pair of players needs:

- 2 Measurement Scavenger Hunt Record Sheets (1 for each player)
- 1 clear spinner overlay

Each pair of players also needs access to:

- Measuring tape marked with millimeters
- Pan balance scale
- Metric masses: 7 boxes of 100 paperclips, 1 bag of 50 one-gram cubes, a container of loose 1-gram cubes
- Modeling clay
- 1-quart/1-liter measuring cup
- Pitcher or container with a pour spout, filled with about 1 liter of water
- Several different unmarked containers of different volumes
- Dish towel or paper towels

- 1 Players each record their name and the date on individual record sheets.
- 2 Working together, players spin the measurement spinner to find out if they are going to measure mass, volume, or length. Then they spin the quantity spinner to find out how much mass, volume, or length they are looking for. They record the results in the first two columns on the table on their record sheets.

1	Volume	750	grams milliliters millimeters	greater than	I would dump some out and try again.
2	Length	100	grams milliliters millimeters	less than	I would measure again.

- 3 Then the scavenger hunt begins! Because this activity is about estimating, players take a guess before finding the actual mass, volume, or length of whatever they are measuring.
- 4 If players spin mass, they will use modeling clay.
 - Players make a ball of clay to try to approximate the mass they spun.
 - Then, they find the actual mass of the ball of clay they made by placing it on one side of the pan balance scale, and using the metric masses on the other.
- 5 If players spin volume, they will use water.
 - Players pour water from the pitcher into one of the containers to try to approximate the amount they spun.
 - Then they pour water from the container into the measuring cup to find its actual volume.
- 6 If players spin length, they find an object in the classroom.
 - Players look for an object in the classroom that is approximately the length they spun on the quantity spinner. For example, if they spin 750, they find an object that they think is about 750 millimeters long.
 - Then, they measure the object to find out how long it actually is.
- 7 Players record the results on their record sheets.
- 8 Players repeat Steps 2–7 until their record sheets are filled.

NAME _____

DATE _____



More or Less?

1 Look at the following items and circle what you believe to be the correct answer.

A balloon has a mass of	more than	less than	a kilogram.
Two hamburgers have a mass of	more than	less than	a kilogram.
A glass of juice holds	more than	less than	a liter.
A leaf has a mass of	more than	less than	a gram.
A washing machine holds	more than	less than	a liter.
A bottle of ketchup holds	more than	less than	3 liters.
A loaf of bread has a mass of	more than	less than	a kilogram.
A handful of popcorn has a mass of	more than	less than	a gram
Five boxes of 100 small paperclips have a mass of	more than	less than	a kilogram.
A can of soda holds	more than	less than	a liter.
A bathtub holds	more than	less than	20 liters.

2 Make up some of your own more than and less than questions.

_____ has a mass of	more than	less than	_____
_____ has a mass of	more than	less than	_____
_____ has a mass of	more than	less than	_____
_____ holds	more than	less than	_____
_____ holds	more than	less than	_____
_____ holds	more than	less than	_____

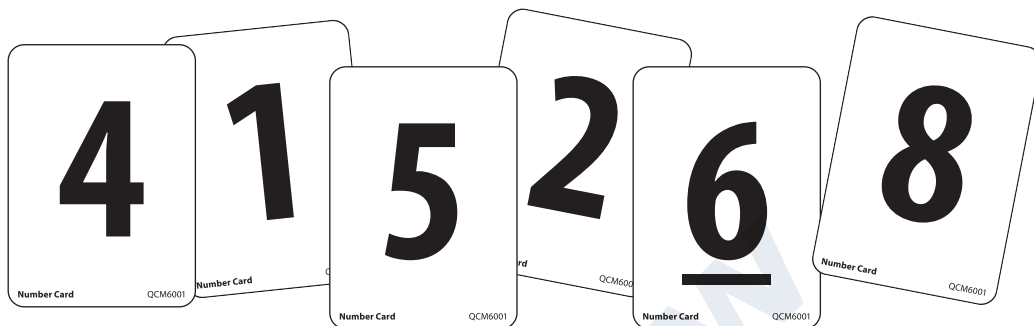


Work Place Instructions 4C Target One Thousand

Each pair of players needs:

- 1 deck of Number Cards with the wild cards removed, shuffled
- 2 Target One Thousand Record Sheets (1 for each player)

- 1 Players take turns drawing 8 Number Cards from the deck.
- 2 Each player chooses 6 cards to make two 3-digit numbers that together have a sum as close to 1,000 as possible.



With these cards, a player could make $156 + 824$ (sum of 980) or $156 + 842$ (sum of 998). Since 998 is closer to 1,000 than 980 is, making 156 and 842 with the cards is a better move.

- 3 Players write an addition equation with their numbers and their sum on the record sheet.
- 4 Players take turns double-checking each other's calculations.
- 5 Each player determined their score for the round by finding the exact difference between their sum and 1,000.
- 6 A sum of 980 has a score of 20. A sum of 1,002 has a score of 2. A sum of 1,000 has a score of 0.
- 7 Players record both their own score and their partner's score for the round.
- 8 Each player puts the 6 cards they used in the discard pile, and then takes turns getting 6 new cards.
- 9 The game continues for two more rounds (three rounds in all).
- 10 After three rounds, players add their scores to determine the winner. The player with the lower score wins the game.

Game Variations

- A Players can review 2-digit addition by playing Target One Hundred (Work Place 1G).
- B Players can challenge themselves by playing Target Ten Thousand and making addends out of all 8 cards.
- C Players can choose to use wild cards. A wild card can be any numeral. When players use a wild card, they put a star above the number made from the wild card in the equation on the record sheet.

NAME _____

DATE _____



Bird Measurement Problems page 1 of 2

Solve the problems on this sheet and the next. Show your thinking using words, numbers, or sketches.

- 1** A bird named Sal has a mass of 149 grams. Sal landed on a leaf next to a bird named Ted with a mass of 398 grams. How much mass do they have together? Be sure to label your answer with the correct units.

Together, Sal and Ted have a mass of _____
Units

- 2** How much more mass does Ted have than Sal? Be sure to label your answer with the correct units.

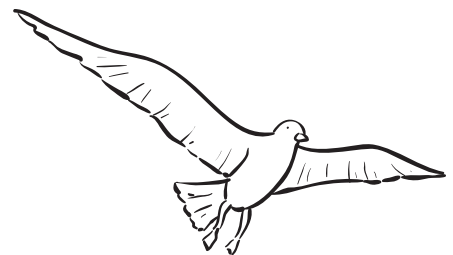
Ted has _____
Units more mass than Sal.

- 3** If Sal leaves his nest at 1:30 and flies for 2 hours and 10 minutes, what time does he come back?

Sal comes back at _____.

- 4** If Ted leaves his nest at 8:50 and flies for 30 minutes, what time does he come back?

Ted comes back at _____.



(continued on next page)

NAME _____

DATE _____

Bird Measurement Problems page 2 of 2

- 5** Ted jumped into a beaker of water that held 313 ml of water. When he flew back out, there was only 189 ml of water left. How much water had splashed out of the beaker?

_____ had splashed out of the beaker.
Units

- 6** Ted's nest has three times as much mass as Ted. How much mass does Ted's nest have?

Ted's nest has a mass of _____
Units

- 7** Sal's nest has three times as much mass as Sal. How much mass does Sal's nest have?

Sal's nest has a mass of _____
Units

- 8 CHALLENGE** Sal's mother has a mass of 450 grams, which is 6 times the mass of his baby brother, Sammy. How much mass does Sammy have?

Sammy has a mass of _____
Units



Mr. Measure

Mr. Measure is a measuring man. He uses his ruler, meter stick, scale, pan balance scale, and other tools to measure. Help Mr. Measure find measurements in the problems below. Use the correct unit in your answer. Use numbers, sketches, or words to show your work.

- 1 Mr. Measure measures rainfall for two months. In the first month, there was 129 ml of rain. In the second month, there was 285 ml of rain. How many milliliters of rain fell in these two months?
- 2 Mr. Measure found the mass of 2 rocks. A gray rock has a mass of 276 g. A black rock has a mass of 413 g. How much more mass does the black rock have?
- 3 It takes Mr. Measure 30 seconds to measure the height of each of his houseplants. How long does it take Mr. Measure to measure the height of 9 houseplants?
- 4 **CHALLENGE** How many minutes does it take Mr. Measure to measure his houseplants?

**More Measurement Problems** page 1 of 2

Solve the following problems. Show your thinking using words, numbers, or sketches. Label your answers with the correct units.

- 1** There were 5 lizards sitting on one side of a pan balance scale. Together, the lizards had a mass of 234 grams. One lizard with a mass of 25 grams got off the balance and a different lizard with a mass of 43 grams got on. Now, how much mass do the 5 lizards on the balance have?

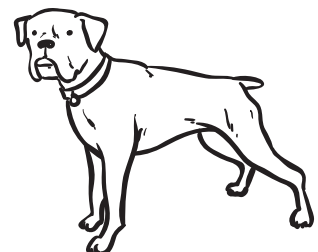
The 5 lizards on the pan balance scale have a mass of _____.

- 2** There are 4 puppies and each puppy has a mass of about 3 kilograms. The mother dog has a mass that is 5 times as much as one of her puppies. How much mass do all 5 dogs—the 4 puppies and their mother—have together?

The 5 dogs together have a mass of _____.

- 3** The dog's water dish had 23 milliliters of water. The owner added water so that there was 4 times that amount. The dog drank 39 milliliters of that water. How much water was left in the dish?

There was _____ of water left in the dish.



NAME _____

DATE _____

More Measurement Problems page 2 of 2

- 4** Abby is four times taller than her dog, Gabi. Gabi is 51 centimeters tall. How tall is Abby when she is wearing shoes that are 6 centimeters tall?

Abby is _____ tall.

- 5** Use the number line provided to model and solve each of these problems.

- a** The Math Club started baking at 3:35 p.m. and baked for 3 hours and 30 minutes. What time did they finish?



The Math Club finished baking at _____.

- b** The Math Club started setting up for the bake sale the next day at 11:45 a.m. They were ready to start the bake sale at 1:30 p.m. How long did it take them to set up?



It took the Math Club _____ to set up.



Millie Millipede

Although Millipede means thousand legs, millipedes actually have less than 400 legs. Millie is a millipede who has about 200 legs. Help Millie find solve the problems below. Use the correct unit in your answer. Use numbers, sketches, or words to show your work.

- 1 One day, Millie Millipede started walking in her garden at 11:15. She walked for 1 hour and 30 minutes. What time was it when she stopped walking?
- 2 After all of that walking, Millie was tired and thirsty. She found a shell with 178 ml of water in it. She drank 99 ml. As she drank, she spilled 22 ml. How much water was left in the shell?
- 3 Millie was hungry too. She had 6 bean plants in her garden. There were 7 leaves on each plant. She took 10 bites of each leaf on each bean plant. How many bites did Millie take?
- 4 Then, Millie was tired. She fell asleep for 2 hours. When she woke up, it was 3:45. What time did she fall asleep?



Arnie Orangutan

Orangutans are members of the ape family. They live mostly in trees and use their long arms to swing from branch to branch. Solve the problems below about Arnie the Orangutan. Use numbers, sketches, or words to show your work. Be sure to label each answer with the correct units.

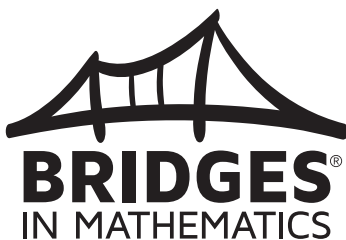
- 1** Arnie Orangutan collected 26 kilograms of bananas. He ate 6 kilograms. Then, he divided the rest between his 4 babies. How many kilograms of bananas did each baby get?
- 2** Arnie Orangutan found a pool of water with about 400 liters of water. He drank 18 liters of water. Then, he jumped in the pool and took a bath. When he finished, there were only 296 liters of water left. How much water splashed out while he was in his bath?
- 3** Arnie Orangutan loves to swing from tree branch to tree branch. On Monday, he swung 286 meters. On Tuesday he was tired and only swung 25 meters. On Wednesday, he swung 5 times as far as he swung on Tuesday. How far did Arnie swing on Monday, Tuesday, and Wednesday all together?
- 4** On Thursday, Arnie started swinging at 11:30. He swung for 3 hours and 20 minutes. What time did he stop swinging?



Home Connections

GRADE 3 – UNIT 4 – MODULE 2

Preview



**Metric Measures of Mass & Liquid Volume** page 1 of 2

- 1** What unit would you use to measure the mass of the following items? Circle the correct answer.
- a** The mass of an envelope
grams kilograms
- b** The amount of soda a straw can hold
milliliters liters
- c** The mass of a 3rd grader.
grams kilograms
- d** The amount of milk in a container at school
milliliters liters
- e** The mass of a loaf of bread
grams kilograms
- f** The amount of water used to take a bath
milliliters liters
- g** The amount of milk in a cake recipe
milliliters liters
- h** The amount of gasoline in a car
milliliters liters
- i** The mass of an apple
grams kilograms
- j** The amount of cough medicine you take
milliliters liters
- k** The mass of a television
grams kilograms

(continued on next page)

NAME _____

DATE _____

Metric Measures of Mass & Liquid Volume page 2 of 2

- 2** Go on a scavenger hunt at home. Try to find objects that have a mass of about 1 gram and about 1 kilogram. Record them below.

1 gram (g)	1 kilogram (kg)

- 3** Now try to find containers that hold about 1 milliliter and 1 liter. Record them below.

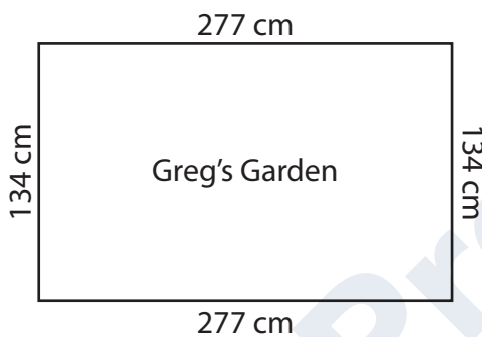
1 milliliter (ml)	1 liter (l)

- 4** What object in your home do you think has the most mass?
- About how much mass does it have in kilograms?
 - What object in your home probably has the least mass?
- 5** What container in your home do you think has the largest capacity (holds the most liquid)?
- About how many liters do you think it holds?
 - What container in your home probably has the smallest capacity?

**Grasshopper Math** page 1 of 2

Grasshoppers are insects that can jump 10 times their height. Help Greg Grasshopper solve the problems below. Use the correct unit in your answer. Use numbers, sketches, or words to show your work.

- 1 Greg Grasshopper has a mass of 3 grams. He climbs onto a leaf with 9 other grasshoppers that each have a mass of 3 grams. Then 4 grasshoppers jump off of the leaf. What is the total mass of the grasshoppers that are still on the leaf?
- 2 Greg Grasshopper lives in a rectangular garden. One side of the garden is 134 cm long. The other side is 277 cm long. If Greg Grasshopper walks all the way around his garden 2 times, how far has he walked?



- 3 Walking always makes Greg Grasshopper hungry. After he walked around his garden twice, he ate 387 milligrams of grass and 246 milligrams of leaves. How many milligrams did he eat?
- 4 Then Greg was tired. He fell asleep for 2 hours. When he woke up, it was 3:45. What time did he fall asleep?

(continued on next page)

Grasshopper Math page 2 of 2

5 Greg Grasshopper has three cousins: Gary, Grant, and Garth. They all can jump 10 times farther than their length. Figure out how many jumps each cousin needs to make to travel a distance of 9 meters. (Hint: There are 100 centimeters in a meter.) Use numbers, sketches, or words to show your work.

a Gary is 3 centimeters long.

Gary has to make _____ jumps to travel a distance of 9 meters.

b Garth is 5 centimeters long.

Garth has to make _____ jumps to travel a distance of 9 meters.

c **CHALLENGE** Grant is 4 centimeters long.

Grant has to make _____ jumps to travel a distance of 9 meters.