

This is a one-week excerpt from the Starfall Kindergarten Mathematics Teacher's Guide.

If you have questions or comments, please contact us.

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Basic Measurement

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Basic Measurement

Week 27

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Week 27 Summary

This week the children will be introduced to the concept of heavier and lighter. They will compare size and weight to discover that the larger object does not always weight more. The children will explore the concept of capacity. They will also:

- Practice making estimates or smart guesses
- Order containers by their capacity
- Compare estimates to actual capacity
- Match common measuring tools to their functions

Preparation

DAY 1

Mix the Addition and Subtraction Equation Cards together to form one deck to use in today's Magic Math Moment.

Prepare a sheet of chart paper to resemble *Backpack Bear's Math Workbook #2*, page 34.

You will need a book for each child, measuring cups, a pan balance, and a ruler for today's lesson.

Lighter	Heavier

DAY 2

You will need two large paper bags for today's Magic Math Moment. One should be empty, and the other should contain several books.

Create a collection of several objects, which will be compared by size and weight, such as a feather, beach ball, blown up balloon, baseball, book, and a rock.

You will also need your own individual whiteboard and marker, a pan balance and several connect cubes, a box of crayons, and individual whiteboards and markers for the children.

DAY 3

Prepare a chart like the one pictured. If possible, tape the actual objects next to their names.

You will use a water bottle, a quart container, a cup, a bucket, and several boxes of various sizes to introduce capacity.

How much will it hold?		
Object	Estimation	Actual
Popcorn		
Cotton Balls		
Rice		
Beans		
Pasta		

You will need an empty container, a plastic or paper cup, newspaper to cover the floor, and large containers of popcorn kernels, cotton balls, rice, beans and pasta.

DAY 4

Display the Measurement Picture Cards (length/height, weight, and capacity) in a pocket chart.

You will need a “A Walk in the Park” game board, a game spinner labeled with the numerals 1 through 5, and playing pieces. You will also need the Measuring Tools Picture Cards.

DAY 5

Activity Center 1 — Navigate classroom computers to *Starfall.com*.

Activity Center 2 — Supply a pan balance, a box of cubes, and a collection of classroom items for the children to weigh, such as a bottle of glue, book, eraser, block, toy car, etc. You will need as many different objects as there are children in the group.

Activity Center 3 — The children will need a “A Walk in the Park” game board, a game spinner labeled with the numerals 1 through 5, and playing pieces. They will also need the Measuring Tools Picture Cards.

Activity Center 4 — Prepare materials for this week’s Teacher’s Choice Activity.

Summative Assessment — The children will use the materials from **Day 3**, (large container of popcorn kernels, cotton balls, rice, beans, and pasta, an empty container, newspaper to cover the floor, and plastic or paper cup that is a different size from the one used on **Day 3**) to measure capacity.

Prepare a Summative Assessment Checklist for Unit 11, Week 27.



Summative Assessment
Unit 11 - Week 27

DAY 1

DAY 2

Daily Routines

- Calendar
- Weather
- Number Line
- Place Value
- Hundreds Chart

Magic Math Moment

Addition and Subtraction Equation Cards

Comparing size and weight

Math Concepts

Distinguish plus and minus signs

Explore connection between weight and size

Weigh objects

Weighing objects

Lighter and heavier

Use the pan balance to weigh objects

Estimate weight

Formative / Summative Assessment

Use a pan balance to weigh objects

Estimate weight and use pan balance to check

(lightest/heaviest)

Workbooks & Media

Workbook p. 34

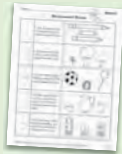


Starfall.com: Measurement: "Weight"

DAY 3	DAY 4	DAY 5
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- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • Calendar • Weather • Number Line | <ul style="list-style-type: none"> • Place Value • Hundreds Chart | |
|--|---|--|

Learning Centers

Numbercise	Number Line plus and minus	<p><i>Starfall.com:</i></p> <ul style="list-style-type: none"> • Monthly Calendar • Geometry & Measurement: "Weight," and "Puzzles" 	1
<p>Perform exercises to equal plus and minus 1 problems</p> <p>Introduce capacity</p> <p>Match containers to what they measure (capacity)</p> <p>Compare containers of varying sizes</p> <p>Capacity estimation</p>	<p>Find the number that is plus 1 or minus 1</p> <p>Measurement review</p> <p>"Guess the Measuring Tool"</p> <p>Introduce "A Walk in the Park" (Variation)</p>	<p>Measuring Weight</p>	2
<p>Discussion of containers that took most/least cups to fill</p>	<p>Measurement review</p>	<p>"A Walk in the Park" (Variation)</p>	3
<p><i>Backpack Bear's Math Big Book, page 42</i></p>	<p>Workbook p. 35</p> 	<p>Teacher's Choice</p>	4
		<p>Summative Assessment: Measuring Capacity</p>	5

Magic Math Moment

Addition and Subtraction Equation Cards

Mix the Addition and Subtraction Equation Cards together to create one deck. Say: **Let's review addition and subtraction equations. When you see the equation card, be sure to look carefully at the sign. If it is a plus sign what should you do? (Volunteers respond.) Right, you add. If you see a minus sign what should you do? Yes, you subtract. Ready?**

Flash the Addition and Subtraction Equation Cards. Remind the children often to look carefully at the signs.

Materials

- Addition and Subtraction Equation Cards (mixed)

Counting & Cardinality

B.4 - Understand the relationship between numbers and quantities.

Measurement & Data

A.2 - Compare two objects with a common measurable attribute.

MD.1 - Identify and use measurement tools.

Lighter or Heavier?

Essential Question: How can we use measurement to describe and compare objects?

Materials

- A book for each child
- Backpack Bear's Math Workbook #2, page 34
- Prepared chart paper
- Measuring cups
- Pan balance
- Ruler

1 Weigh Objects

Indicate a classroom book. Say: **Look at this book. What tool might you use to measure this book?** Volunteers respond. Responses will most likely involve length attributes.

Distribute a classroom book to each child.

Say: **Another way to measure an object is by weight. Does your book feel heavy or light?**

Demonstrate how the children can hold the books in the palms of their hands to feel their weight. Ask:

- **What objects in this classroom, would you estimate, weigh less than, or are lighter than your book?**
- **What objects in this classroom, would you estimate, weigh more, or are heavier than your book?**

Hold a book in the palm of one hand and a pencil in the other. Demonstrate raising one hand to focus on the weight of that object, and then the other. Say: **It seems that the book is heavier than the pencil.**

Repeat with a globe or another object you know to be heavier than the book. Say: **This time the (chosen object) seems to be heavier than the book.**

2

Record Lighter or Heavier

Indicate the prepared chart paper.

Say: **Since the pencil was lighter than the book, let's write pencil under "lighter" and book under "heavier."** Do this.

Distribute *Backpack Bear's Math Workbook #2* and instruct the children to turn to page 34.

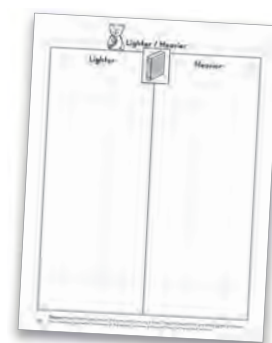
Say: **Walk around the classroom and try to find objects that are lighter than your book. When you find an object that is lighter than the book, write the name of the object or draw a picture of it in this column, under the word lighter.** Indicate the correct column on the chart paper, as children locate it on their workbook page.

After several minutes stop the children and say: **Now try to find objects that are heavier than your book. When you find an object that is heavier than your book, write the name of the object, or draw a picture of it, in this column under the word heavier.** Indicate the correct column on the chart paper, as children locate it on their workbook page.

Gather the children in front of the chart paper. Say: **Let's add the objects you found to the chart paper.** Add the names of objects to the list as volunteers report their results.

Note: If the children name objects that are bigger than their books, but not heavier, remind them that bigger doesn't always mean heavier.

Lighter	Heavier



Formative Assessment

Check Responses

Indicate and identify the measuring cups, pan balance, and ruler.

Ask: **If we want to check to be sure these objects are lighter or heavier than the books, which of these measuring tools should we use? Why?**

Continue: **Let's check some of the objects on the list to see if we were right.**

Volunteers retrieve some of the classroom objects from the lighter/heavier list. Demonstrate how to place the book and the objects on the pan balance to determine if the objects are lighter or heavier than the book.

The children discuss the results.

Comparing Size and Weight

Indicate 2 large paper bags. Say: **Look at these bags. Is one of these bags bigger or smaller than the other, or are they both the same size?** (Volunteers respond.) **Right, they are both the same size.**

Ask: **Can you tell which bag weighs more?**

Explain: **We can't tell which bag weighs more just by looking at them. One bag might weigh more than the other, or they might both weigh the same. How can we tell?**

A volunteer lifts one bag and then the other to determine whether one is heavier. Ask: **Is one bag heavier than the other or do they weigh the same?** (The volunteer responds.) **Right, one bag is heavier. Why do you think one bag is heavier or weighs more than the other?** (Volunteers respond.) **Right, one bag is empty and the other bag has books in it. Could you tell that by just looking at the bags?**

Materials

- 2 large paper bags (1 empty and 1 containing several books)

Measurement & Data

A.1 - Describe measurable attributes of objects.

A.2 - Compare two objects with a common measurable attribute.

Estimation

E.1 - Understand the meaning of estimation.

Weighing Objects

Essential Question: *What can we measure?*

1 Compare Objects

Indicate the collection of objects. Say: **Some of these objects are larger than others. Which of these objects are the larger ones?** (feather, beach ball, balloon)

Continue: **Some of these objects are smaller than others. Which of these objects are the smaller ones?** (baseball, marble, rock)

Ask: **Which is heavier, the balloon or the baseball? Right, even though the baseball is smaller, it is heavier than the balloon.**

2 Explore Weight

Say: **Let's check to see if the baseball is heavier than the balloon. Select a volunteer to hold the balloon in one hand the baseball in the other to test the results.**

Say: **The baseball is heavier than the balloon. Is the baseball larger?** (Volunteers respond.) **No, the balloon is larger than the baseball, so why is the baseball heavier than the balloon?**

Explain: **The balloon is filled with air and air is light. The baseball is filled with stuffing and that stuffing is heavier than air. Remember, bigger doesn't always mean heavier!**

Materials

- Objects to weigh (suggested objects: feather, beach ball, balloon baseball, book, rock)
- Pan balance
- Cubes
- Box of crayons
- Individual whiteboards, markers
- Teacher whiteboard, marker

Repeat the above comparing the feather and the rock, and the beach ball and book.

Ask: **What can we do if we are not sure which object is lighter, which object is heavier, or if they both weigh the same?** (Volunteers respond.) **Right, we can weigh the two objects.**

Navigate a classroom computer to *Starfall.com*: Measurement: "Weight."

3 Use the Pan Balance

Explain: **There will be one object on the pan balance and cubes of different weights below. Let's see if we can find how many of the cubes are needed to equal the weight of the object.**

The class responds "lighter" or "heavier" as volunteers select cubes.

4 Estimate Weight

Gather the children in a semi-circle on the floor or a rug.

Indicate the pan balance, box of cubes, box of crayons, feather, beach ball, balloon (blown up), baseball, book, and rock.

Say: **Here is a box of crayons. I will put the box of crayons on one side of the pan balance. (Do this.) Here are some cubes. I will make a smart guess, or estimate how many cubes it takes to equal the weight of the box of crayons.**

Write your estimate on a whiteboard and show it to the children. Continue: **I estimate that the box of crayons weighs (estimated number) cubes. Let's weigh it to find out if the estimate is correct.**

The children count with you as you add cubes to the other side of the pan balance. Stop when both sides of the pan balance are level. Say: **The actual number of cubes it takes to equal the weight of the box of crayons is (actual number). Write the number on your whiteboard, and compare your estimate with the actual count.**



Formative Assessment

Compare Estimates

Divide the class into 6 groups. Distribute individual whiteboards and markers to the children, and one of the objects to each group.

One group comes forward to show its object to the class. The children write estimates on their whiteboards for how many cubes equal the weight of the object.

The children in the group take turns placing cubes on the pan balance while the class counts. The children write the actual number on their whiteboards.

Compare the estimates to the actual number. Write the name of the object and the actual total for each object on your whiteboard as each group weighs its object. Repeat for each group.

Show your whiteboard and review the totals for each object. Ask: **Which object was lightest? Which object was heaviest?**

If writing the numbers on their whiteboards is too challenging, ask for verbal responses instead.

Numbercise (+1/-1)

Materials

 None

Instruct the children to stand. Say: **I will say a number.**

Then I will say either “plus 1” or “minus 1.” If I say “plus 1” add 1 to the number, and if I say “minus 1” take 1 away. The answer is how many times you do the exercise.

Let’s try one together. Say: **Hop, 7 plus 1. How many times should you hop? Right, you will hop 8 times because 7 plus 1 equals 8.** The children hop 8 times.

Continue: **Here’s another one. Turn around, 5 minus 1.** The children should turn 4 times.

Continue to make up different movements and include a plus or minus 1.

Operations & Algebraic Thinking

A.1 - Represent addition and subtraction in a variety of ways.

Measurement & Data

MD.4 - Compare and measure capacity using nonstandard units.

Estimation

E.1 - Understand the meaning of estimation.

Capacity

1 Introduce Capacity

Indicate *Backpack Bear’s Math Big Book*, page 42.

Say: **We talked about how to measure how much something weighs. Who can find the measuring tools that measure how much something weighs on Backpack Bear’s page?** (Volunteers do this.)

Continue: **Today we will talk about ways to measure how much an object can hold. We call that capacity. Say, capacity.** (Children repeat, *capacity*.) **Capacity is the amount an object can hold.**

Say: **Let’s play, “I Spy.” Listen to clue and find the picture that shows the answer. Ready?** After each clue, volunteers indicate and identify the answers. Classmates may help as needed.

- **I spy a measuring tool that holds water or milk. I can put it in the refrigerator. What measuring tool is it?**
- **I spy a measuring tool that tells how much salt to add to my soup. What measuring tool is it?**
- **I spy a measuring tool that will help measure how much rice to cook. What measuring tool is it?**

Materials

- Backpack Bear’s Math Big Book*, page 42
- Estimate with Backpack Bear*
- Water bottle
- Measuring spoons
- Measuring cup
- Quart container
- Bucket
- Several boxes of varying sizes
- Prepared chart paper
- Plastic or paper cup
- Empty container
- Newspaper (to cover the floor)
- Large containers of:
 - Popcorn kernels
 - Cotton balls
 - Rice
 - Beans
 - Pasta



2 Compare

Indicate several containers of varying sizes. Ask:

- Which of these containers would hold the most water?
- Which would hold the least water?
- How can you tell?

Indicate two of the containers. Say: **Look at these two containers. Which of these containers would hold more?**

Indicate two different containers: Ask: **Which of these two containers would hold less?**

Indicate several boxes of varying sizes. Ask:

- Which of these boxes would hold the most?
- Which would hold the least?
- How can you tell?

3 Capacity Estimation

Say: **Let's see if Backpack Bear can help.** Read page 33 of *Estimate with Backpack Bear*. The children make estimates and explain their choices.

How much will it hold?		
Object	Estimation	Actual
Popcorn		
Cotton Balls		
Rice		
Beans		
Pasta		

Indicate the prepared chart paper. Say: **Today we will try some experiments. We will use this chart to record information we learn from the experiments. Let's use a cup as our unit of measure.**

Continue: **First we will estimate how many cups it will take to fill the container. Then we will measure how many cups it actually takes to fill the container to see how close our answers were.**

Gather the children in a semi-circle and divide them into 5 groups. Each group will be assigned different items to measure.

Demonstrate the experiment with Group 1 using popcorn kernels. Place the large container of popcorn kernels, empty container, and cup on newspaper on the floor.

- Indicate the container of popcorn kernels, the empty container, and the cup.
- Group 1 estimates how many cups of popcorn kernels will fit into the empty container.
- Get a consensus, and a child writes that number under "Estimation" on the chart paper.
- The children in Group 1 take turns filling the cup with popcorn kernels and pouring them into the empty container as the class counts.
- Establish the actual number of cups of popcorn kernels that fit in the container. A volunteer writes the number on the chart paper.

Repeat the above steps with the remaining groups:

- Group 2 — cotton balls
- Group 3 — rice
- Group 4 — beans
- Group 5 — pasta



Formative Assessment

Evaluate Estimations

Evaluate the chart when it is complete.

Ask: **Which item took the most or the least cups to fill the container?**
(Volunteers respond.)

Explain: **Right, it took the same number of cups of each item to fill the container! Why do you think that is?** The children should understand that no matter how large or small the item being measured is, it still takes the same number of cups to fill the container.

Say: **Let's check *Estimate with Backpack Bear* for more practice.**

Discuss pages in the book that deal with estimating capacity as time allows.

Number Line Plus/Minus

Distribute individual whiteboards and markers.

Say: **I will say a number and either plus 1 or minus 1. You write the number that is plus or minus 1. You can use the Number Line to help you. Ready?**

Say: **Write the number that is 10 plus 1 on your whiteboard. Then hold it up.** The children do this. Discuss the correct answer then the children erase their numbers.

Repeat with 15 minus 1, 20 plus 1, and other numbers as time allows.

Materials

- Whiteboards/markers

Measurement Review

1 Guess the Measuring Tool

Indicate the Measuring Tools Picture Cards displayed in a pocket chart.

Say: **Let's play "Guess the Measuring Tool." Listen to the question. A volunteer will select the best measuring tool and explain why that was the tool he or she chose. Ready?**

- **If your parents would like to build a toy box to fit in your bedroom, what measuring tool could they use to measure how big the toy box might be?**
- **If you want to buy 1 pound of apples at the fruit stand, what measuring tool could you use to find out how many apples there are in 1 pound?**
- **If you need a blanket to fit your bed, what measuring tool could you use to make sure you choose the right one?**
- **If you want 2 cups of cereal for breakfast, what measuring tool could you use to measure the cereal?**
- **When you go to the doctor's office and the nurse weighs you, what measuring tool does the nurse use?**
- **If you would like to know how tall you are, what measuring tool could you use?**
- **If you need to weigh some sand so there is the same amount in two piles, what measuring tool could you use?**

Materials

- Pocket chart
- "A Walk in the Park" game board
- Spinner (1-5)
- Playing pieces
- Measuring Tools Picture Cards
- Backpack Bear's Workbook #2, page 35
- Crayons

Operations & Algebraic Thinking

A.1 - Represent addition and subtraction in a variety of ways.

Measurement & Data

MD.4 - Compare and measure capacity using nonstandard units.

Estimation

E.1 - Understand the meaning of estimation.

Some questions have more than one correct answer. If the children's answers differ, take the opportunity to compare their choices.

2 Introduce “A Walk in the Park” Variation

Gather the children in a semi-circle and demonstrate the variation of “A Walk in the Park” game.

Directions:

- Place all of the Measurement Tools Picture Cards face down in a deck.
- The children take turns to draw the cards and identify how the tools are used.
- They spin the spinner and move the corresponding number of spaces

Explain that “A Walk in the Park” will be one of the Learning Centers on **Day 5**.



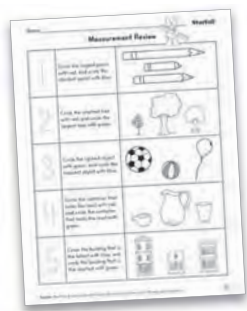
Formative Assessment

What I Know!

Distribute *Backpack Bear’s Math Workbook #2* and instruct the children to turn to page 35. If you have projection capabilities, prepare a copy of the workbook page and project it for use as a guide.

Complete this worksheet together as follows:

- Find and trace over the number one.
- Read the sentence.
- The children circle the object.
- The children check with their neighbors and make adjustments as needed.



Learning Centers

DAY

5

1 Computer

The children explore:

- Monthly calendar
- Geometry and Measurement: "Weight"
- Geometry and Measurement: "Puzzles"

Children may navigate to other *Starfall.com* math activities after they have explored those suggested above.

Materials

- Computers navigated to *Starfall.com*

Measurement & Data

MD.1 - Identify and use measurement tools.

MD.4 - Compare and measure capacity using nonstandard units.

2 Measuring Weight

The children use cubes as their units of measure to determine how many cubes weigh the same as a given object.

The first child chooses an object to measure and places it on one side of the pan balance. The children in the group estimate how many cubes weigh the same as the object.

The child then places cubes on the other side of the pan balance while the group counts.

When the weight of the cube matches the weight of the object, the group determines how close the actual answer is to their estimates.

The next child chooses a different object, and the children repeat the procedure.

Materials

- Pan balance
- Box of cubes
- Classroom items to weigh such as a bottle of glue, book, eraser, block, toy car, etc. (as many different objects as there are children in the group)

3 "A Walk in the Park" Variation

- Place all the Measurement Tool Picture Cards face down in a deck.
- The children take turns to draw cards and identify the tools. They then spin the spinner and move the corresponding number of spaces.

Materials

- "A Walk in the Park" game board
- Game spinner numbered 1-5
- Playing pieces
- Measuring Tools Picture Cards



4 Teacher's Choice

Review or expand a skill from this unit according to the needs of your students.

5 Summative Assessment: Measuring Capacity

The children work with partners and experiment using a cup to measure items into an empty container. They record their results on whiteboards.

Optional: You may replace this activity with another one that focuses on capacity.

Observe the children as they experiment with capacity and record their progress on the Summative Assessment Checklist for Unit 11, Week 27.

Materials

- Use materials from **Day 3**, changing the size of the cup the children use to measure
- Large container of popcorn kernels, cotton balls, rice, beans, and pasta
- Empty container
- Plastic or paper cup (different size from **Day 3**)
- Newspaper to cover the floor
- Individual whiteboards, markers
- Prepared Summative Assessment Checklist Unit 11, Week 27

