Basic Measurement

Starfall Kindergarten MATHEMATICS

Basic Measurement

Unit 11 • Overview

Week 25

Week 26

Week 27

Unit 11 Frequently Asked Questions

The Starfall Math Curriculum seems to spend a great deal of time on measurement activities. How can this fit into the schedule and still allow time to achieve all of the other standards?

Unfortunately, with the shift from the concept of kindergarten as a developmentally appropriate setting that included a housekeeping area, sandbox, and large and small block centers, to a much more academic setting, young children do not have as much opportunity to practice measurement skills in a play environment as they once did. Experimenting with measurement takes time because it must be hands-on, so measurement activities are included throughout the curriculum, with a focus on measurement in Unit 11. Children need to manipulate and experiment with measurement concepts in order for real understanding to occur.

Only nonstandard measurement is included in the program. Wouldn't it be better to introduce children to a ruler and other standard measurement tools?

It is important for children to understand the concept of measurement in a developmentally -appropriate way. It is also important to teach the underlying concepts before introducing more difficult units of measure such as measuring tapes and rulers, etc. Concepts such as always measuring from the baseline, or always measuring with the same-sized unit of measurement (paper clip, craft stick, cube, etc), and estimating length and height are emphasized and practiced throughout all of the measurement activities.

Later in the program children are introduced to standard units of measurement, but they are not required to use them to measure.

Unit 11 Research

In addition to learning about number and shape, early childhood also includes development of measurement, which is a fundamental aspect of mathematics that connects geometry and number.

In its most basic form, measurement is the process of determining the size of an object. To measure a quantity (with respect to a given measurable attribute, such as length, area, or volume) a unit must be chosen. Children begin with nonstandard units: craft sticks to measure the length of a classroom rug; square 1" tiles to measure the area of a table; cube-shaped blocks to measure a book. So when a unit is chosen, a measurement is the number of those units. An important idea about units which children learn gradually is that when measuring a given object, the larger the unit used to measure, the smaller the total number of units. Because the concept of units underlies core ideas in number, geometry and measurement, it has been recommended as a central focus for early childhood mathematics education.[1]

The development of measurement skills usually starts with directly comparing objects along one dimension. Thus children generally succeed in measuring length prior to area and volume.[2] Starfall Math introduces children to nonstandard measures to determine the length and height of classroom objects, and offers many activities for practice in ordering objects by length.

An important feature of their learning during this period is that children have difficulty understanding units of measure. Young children can be successful at measurement when given appropriate instruction. Both research with children and interviews with teachers support claims that (a) the principles of measurement are difficult for children, (b) they require more attention in school than is usually given, (c) time needs to first be spent in informal measurement, in which the use of measurement principles is evident, and (d) transition from informal to formal measurement needs much more time and care.[3]

Children's early competency in measurement is facilitated by play with structured materials, such as unit blocks, pattern, blocks, and tiles, and strengthened through opportunities to reflect on and discuss their experiences. Research on the learning of shapes and certain aspects of visual literacy suggests the inclusion of these topics in the early years can be powerful.[4] Starfall Math affords children many opportunities to describe measurable attributes of objects and compare two objects with a common measurable attribute.

(1) Sophian, C. (2007). Rethinking the starting point for mathematics learning. In O.N. Saracho and B. Spodek (eds.), *Contemporary Perspectives in Early Childhood Education: Mathematics, Science, and Technology in Early Childhood Education* (pp. 21-44). New York: Information Age.

(2) Hart, K. (1984). Which comes first – length, area, or volume? *Arithmetic Teacher,* 31. 66-18, 26 – 27.

(3) Irvin, K.D., Vistro-Yu, C.P., and Ell, F.R. (2004). Understanding linear measurement: A comparison of Filipino and New Zealand children. *Mathematics Education Research Journal*, 16(2), 3-24.

(4) National Mathematics Advisory Panel. (2008). *Foundations for Success: The Final Report of the National Mathematics Advisory Panel.* Washington, DC: U.S. Department of Education.

Unit 11 Summary

Time Frame: 15 days

In Unit 11 the children will be introduced to measurement, and learn to correctly use a variety of nonstandard units of measure to measure the length and height of several classroom objects. They will discuss the concept of shorter and longer, and practice ordering objects by length. They will also learn about surface area and experiment with inclines.

Other concepts introduced in Unit 11 include fractions as parts of a whole object or set, symmetry, and capacity. The children will learn to estimate weight, and to weigh objects.

Essential Questions

(MACC.K.MD.A.1) What can we measure?

(MACC.K.CC.A.2) How can we count on from a given number?

(Starfall.Math.MD.1.2) How can we use measurement to describe and compare objects?

(Starfall.Math.E.1) How do we estimate the amount of objects and compare them to the actual amount?

(Starfall.Math.E.2) Why is making predictions important?

(Starfall.Math.F.1) How can we show equal parts or halves?

Enduring Understandings

Estimation is a very important math skill that relates to all areas of math.

We can use different units of measure to compare objects in the classroom.

It is important to use the same size unit of measure when comparing objects.

We can measure length, height and area.

Making predictions is an important way to apply prior knowledge.

Vocabulary

The children will be introduced to these vocabulary words. Mastery is not expected at this time.

Area	Height	Perimeter
Capacity	Length	Ramp
Denominator	Measure	Unit
Divide	Middle	Whole
Estimate	Numerator	
Fractions	One-half	
Half	Parts	

Recommended Literature

How Big is a Foot? by Rolf Myller

How Many Bugs in a Box? by David A. Carter

Is a Blue Whale the Biggest Thing There Is? by Robert Wells

Me and the Measure of Things by Joan Sweeney

Mighty Maddie by Stuart J. Murphy

Super Sand Castle Saturday by Stuart J. Murphy

What's Up With That Cup? by Sheila Keenan

Who Sank the Boat? by Pamela Allen

Unit 11 Standards & Benchmarks

Progress on the following standards and benchmarks will be made through the course of this unit. For your convenience, applicable learning outcomes are listed alongside each lesson in summary form.

Starfall Standards

Counting & Cardinality	
CC.2	Supply missing number in a sequence.

Estimation	
E.1	Understand the meaning of estimation.

Measurement & Data	
MD.1	Identify and use time measurement tools.
MD.2	Use and interpret graphs.
MD.3	Measure using nonstandard units.

Fractions	
F.1	Name and recognize fractional parts of a whole.

Common Core Standards

Counting & Cardinality		*Inline Summary Form*
A.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	*Count forward from a given number.*
B.4	Understand the relationship between numbers and quantities; connect counting to cardinality.	*Understand the relationship between numbers and quantities.*
B.4a	When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	*Say number names in order, pairing each object with one number.*
B.4b	Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	*The last number counted tells the total number of objects.*
B.4c	Understand that each successive number name refers to a quantity that is one larger.	*Each successive number refers to one more.*

Common Core Standards (Continued)

Operations & Algebraic Thinking | *Inline Summary Form*

A.1	Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.	*Represent addition and subtraction in a variety of ways.*

Measurement & Data | *Inline Summary Form*

A.1	Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.	*Describe measurable attributes of objects.*
A.2	Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.	*Compare two objects with a common measurable attribute.*
B.3	Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	*Classify, count, and sort objects.*

Geometry | *Inline Summary Form*

A.1	Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.	*Describe objects using shapes and relative positions.*
B.6	Compose simple shapes to form larger shapes. For example, "Can you join these two triangles with full sides touching to make a rectangle?"	*Compose simple shapes to form larger shapes.*

Daily ⟳ Routines

📅 **31** Calendar

- A volunteer tells the name of the month.
- The children name the days of the week.
- The calendar helper turns the next number.
- Assist the calendar helper to place one penny on the money graph to match the number of today's date.
- Remind them that there are other coins (nickels, dimes) available, and lead the children to exchange the appropriate number of pennies for these coins.

☁ Weather

- Review yesterday's weather.
- The meteorologist goes to the window to look outside, predicts the weather, and places a tally mark under his or her prediction.
- Add a tally mark next to today's weather on the Weather Graph.

⊢⊣ **-2 -1 0 1 2** Number Line

- Point to and count the days on the number line by ones, fives, or tens.
- Sing "How Many Days Have We Been In School?"
- Remove the sticky note to reveal the next number.

> **How Many Days Have We Been In School?**
>
> *(Tune: "Here We Go Round the Mulberry Bush")*
>
> *How many days have we been in school, been in school, been in school? How many days have we been in school, who can tell me please?*

1|0|0 Place Value

- Review the number of bundles and sticks in the *Tens* and *Ones* containers.
- Add one stick to represent today, and place it in the *Ones* container.
- Write the numeral that represents the number of days the children have been in school on the board.
- Every tenth day the children bundle the ten sticks that are in the *Ones* container and place the bundle in the tens container.

▦ **100** Hundreds Chart

- The number helper turns the next number on the chart.
- Ask: **The hundreds chart shows we have been in school how many days?**

Counting & Cardinality

A.2 – Count forward from a given number.

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

B.4a – Say number names in order, pairing each object with one number.

B.4b – The last number counted tells the total number of objects.

B.4c – Each successive number refers to one more.

Week 25 Summary

This week the children will be introduced to the concept of fractions as parts of a whole, and groups of objects. They will solve story problems using fractions, learn to use nonstandard units to measure height and length, and order objects by length. The children will also:

- Practice making estimates and smart guesses
- Learn that the number of units of measurement changes with the length of the unit
- Divide groups of objects into equal smaller groups (introduction to the concept of fractions)
- Play "Guess The Mystery Number" a variation of "Hangman"

Preparation

DAY ❶

You will need one set of 16 connect cubes, and one bag of 12 connect cubes for each group of three or four children.

DAY ❷

Duplicate a copy of the "Cookie Halves" worksheet for each child.
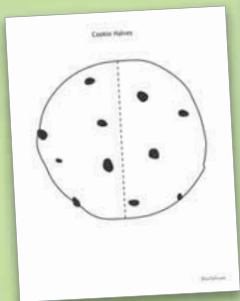
"Cookie Halves" worksheet

DAY ❸

You will need a collection of small beads or other small objects to use for estimation. You will also need craft sticks and connect cubes.

Create three construction paper rectangles, two that are the same length and at least two craft sticks long, and one that is at least three craft sticks long. Save the paper rectangles for use on **Day 4**.

Duplicate a grid paper worksheet strip for each child, long enough to accommodate their names, and cut them apart.
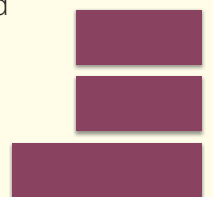
Prepare a chart paper labeled "Comparing Names." After writing their names on the grid paper strips, the children will glue the strips to this chart in order from shortest to longest.

Grid Paper worksheet

DAY 4

Display the three construction paper rectangles from **Day 3** on a whiteboard in random order. You will also need craft sticks and connect cubes for the children to use as nonstandard units of measure.

Prepare a sheet of chart paper to replicate *Backpack Bear's Math Workbook #2*, page 31.

DAY 5

Object	Cubes	Sticks

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

Activity Center 2 — Have a 1-10 game spinner available. With each spin the children will add connect cubes of varying colors to play "Build a Tower."

Activity Center 3 — Provide the children with various manipulatives to use as units of measure, such as connect cubes, paper clips and dominoes. They will also need objects to measure such as pencils, books and cereal boxes. Duplicate a "Learning Center Measurement" worksheet for each child.

Activity Center 4 — Prepare materials for this week's Teacher's Choice Activity.
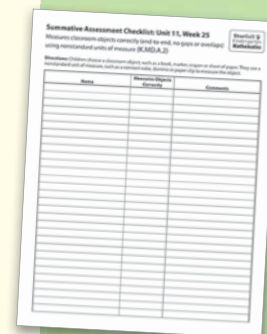
Summative Assessment — The children will use several classroom objects such as books, markers, paper, and crayons to measure, and units of measure such as connect cubes or paper clips.

Prepare a Summative Assessment Checklist for Unit 11, Week 25.
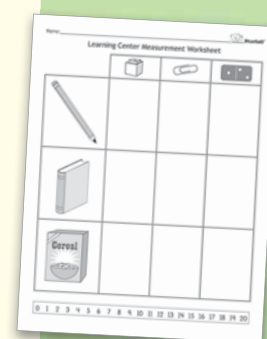
"Learning Center Measurement" worksheet

Summative Assessment
Unit 11 - Week 25

WEEK 25

	DAY 1	DAY 2
Daily Routines	• Calendar • Place Value • Weather • Hundreds Chart • Number Line	
Magic Math Moment	Creating equal groups	"Guess the Mystery Number"
Math Concepts	Divide a group into equal parts Introduce the concept of fractions Use pictures to solve math problems	Identify a number that comes between Introduce halves and fourths Introduce fractions as parts of a whole object or group Use fractions to solve story problems Introduce ½
Formative / Summative Assessment	Divide a group into equal parts (using pictures)	Divide a cookie into halves
Workbooks & Media	Workbook page 29	Workbook page 30

DAY 3	DAY 4	DAY 5
• Calendar • Place Value • Weather • Hundreds Chart • Number Line		**Learning Centers**
Estimation and comparison	Measuring height	*Starfall.com:* **1** • Monthly Calendar • Geometry & Measurement: "Measurement" and "Make Shapes"
Estimate and count to compare Review height and length Measure and compare lengths using different units of measure	Measure and compare height (shortest to tallest) Units of Measure Introduce Baseline	"Build a Tower" **2** Measure the Objects **3** Teacher's Choice **4**
Measure length of names using grid paper as a unit of measure	Measure classroom objects using two different units of measure and compare	Longer/Taller **5** "Learning Center Measurement" Summative Assessment: Measure Classroom Objects (Length) Workbook pages 32 and 33
Backpack Bear's Math Big Book, page 41	*Starfall.com*: Geometry and Measurement, "Measurement" Workbook page 31	

Magic Math Moment

Creating Equal Groups

Select four children to stand in the front of the classroom. Say: **Here are four children. These four children will form pairs or partners. How many children will be in each pair? Right, when you work in pairs there are two children in each pair.**

Partner the four children into two pairs. Ask: **Does each pair have an equal (or the same) number of children? Yes, each pair of partners has two children.** The four children return to their seats.

Select nine children to stand in the front of the classroom. Say: **Here are nine children. These nine children will form groups of three. Let's see how many groups of three they can form.**

Choose three of the children to move apart from the others. Say: **Let's count the remaining children. (**Do this.**) Are there enough children left to form another group of three?**

Choose three more of the children to create another group of three. Continue: **Now there are two groups of three. How many children are left? Right, three! What does that mean? Yes, it means there are enough children left to form another group of three.**

Choose three more of the children to create another group. Ask: **How many groups are there? Does each group have an equal or same number of children? Yes, there are three children in each group.**

Operations & Algebraic Thinking

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

Measurement & Data

B.3 - Classify, count, and sort objects.

Fractions

F.1 - Name and represent fractional parts of a whole.

Introduce Fractions

Materials

☐ One bag of 16 connect cubes

☐ One bag of 12 connect cubes for each group of three or four children

☐ *Backpack Bear's Math Workbook #2*, page 29

☐ Pencils, crayons

Essential Question: *How can we show equal parts?*

1 Demonstrate Equal Parts

Indicate a bag of 16 connect cubes. Say: **Here is a bag of connect cubes. Let's count how many connect cubes there are in the bag.** Count the connect cubes with the children.

Say: **There are sixteen connect cubes in the bag. How could I share the connect cubes with three children so we all have the same number of connect cubes?**

Select three children to come to the front of the classroom. Say: **I will give one connect cube to each of these three children and one to myself. (**Do this.**) Are there enough connect cubes to give each of us another one?**

Explain: **Yes, we can tell there are enough connect cubes left because there are more than four.** Continue to distribute connect cubes to the children and yourself until there are no more remaining in the bag.

Each of the three children tells how many connect cubes he or she has. Ask: **Do we all have the same number of connect cubes? (**Volunteers respond.**) Yes, each of us has four connect cubes, so we all have an equal, or same number. We shared the bag of connect cubes equally.**

2 Share Cubes in Groups

Continue: **Now you will have a chance to work with your friends to share a bag of connect cubes equally.**

Divide the children into groups of three or four and distribute a bag of twelve connect cubes to each group. Say: **First count the connect cubes in your bag. Then work together to decide on a strategy for sharing the connect cubes equally.**

Circulate and observe as the children work together. When the groups have finished, gather the children together and each group shares the strategy used to divide the connect cubes equally. Be sure the groups tell how many connect cubes each child received. The class determines whether the groups divided the connect cubes equally.

3 Use Pictures to Solve Problems

Say: **We can also use pictures to help solve math problems. If there are six lollipops and we want to share them equally among three friends, we could draw a picture to help us figure out how many lollipops each friend would get.**

Draw six lollipops on a whiteboard and three stick people beneath them. Say: **Let's give each stick person one lollipop.** Draw a lollipop next to each stick person. Each time you do, cross out a lollipop above.

Ask:

- **Do the stick people each have an equal number of lollipops?**
- **Are there still enough lollipops to share with the three friends?**

Explain: **Yes, there are enough lollipops to share because there are more than three left.** Share the remaining lollipops.

Ask:

- **Does each stick person have an equal or the same number of lollipops?**
- **Did we share the lollipops equally?**
- **How many lollipops does each stick person have?**

4 Divide Pennies into Honey Jar Banks

Distribute *Backpack Bear's Math Workbook #2* and instruct the children to turn to page 29. If you have projection capability, project the workbook page for demonstration. If you don't, draw 8 pennies and 4 honey jar banks on a whiteboard.

Say: **Look at the pennies and the honey jar banks. How can we put an equal number of pennies into each honey jar bank?** (Volunteers respond**.) Yes, we can do it the same way we did the lollipops and the stick people. Let's start by putting one penny in each bank.** Demonstrate how to draw a penny in each bank one at a time. Cross out a penny above each time you draw one in a bank. Pause for the children to do the same.

Ask: **Does each honey jar bank have an equal, or the same number of pennies? Are there still enough pennies to place in the banks? Why?** (There are four left.**)** Repeat for the remaining pennies.

Ask:

- **How many pennies are in each honey jar bank?**
- **Does each honey jar bank have an equal number of pennies in it?**
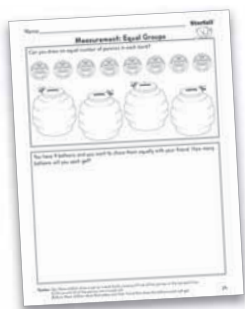
Formative Assessment

Draw Pictures to Solve Problems

Say: **Now you will draw pictures at the bottom of the workbook page to solve a math problem. Listen to the math problem first. Ready?**

- **If you have four balloons and you want to share them equally with your friend, how many balloons would you and your friend each get?**

The children complete their drawings individually. Volunteers share results with the class.

Research suggests that young children need to understand the concept of sharing a group of objects equally before they can understand sharing a single object equally (as with fractions).

Magic Math Moment

"Guess the Mystery Number"
(A variation of "Hangman")

Draw a circle on a whiteboard. Say: **This is one whole circle.**

Divide the circle in half. Continue: **I divided the circle in half. How many parts does the circle have now? Right, the circle has two parts, but it is still one circle.**

Divide the circle into fourths. Say: **Now the circle is divided into more parts. How many parts does the circle have now? Yes, it has four parts, but it is still one circle.**

Draw a horizontal line next to the circle on which to write the "mystery number." Write "Teacher" and "Class" on the whiteboard as headings.

Say: **Let's play a game. If I win I will put a tally mark under "Teacher." If you win, I will put a tally mark under "Class." Ready? I am thinking of a number between zero and ten. Raise your hand if you have a guess. If you guess the correct number I will write that number on the line and the class will get a point. If you don't guess the mystery number, I will write your guess in one of blank spaces in the circle.**

Ask: **How many guesses will you get? Right, you will get four guesses. If you don't guess the mystery number in four guesses, I will get a point!**

Play as time allows. As children make incorrect guesses, take the opportunity to use language such as "You have used one of four guesses" or "You have used three of four guesses."

Counting & Cardinality

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

Fractions

F.1 - Name and represent fractional parts of a whole.

Fractions

Essential Question: *How can we show equal parts or halves?*

1 Whole and Part

Draw a square on a whiteboard. Say: **This is one whole square. Draw a line through the middle of the square so it is divided in half.**

Say: **Look at both parts of this square. Are the two parts equal or the same size?**

Draw a domino, a cube, and a craft stick on the whiteboard.

Say: **Look at these objects. Which one has 2 parts? Right, a domino has two parts that make up the one domino!**

② Introduce Fractions

Say: **Today we will talk about *fractions*. Say, *fractions*.** (Children repeat, *fractions*.) **Does anyone know what a *fraction* is?**

Explain: **Fractions are parts of a whole object or a group of objects.**

Indicate the square. Say: **We started with one whole square. Then we divided the square into parts. Ask:**

- **How many parts is the square divided into?** (two)
- **What do you notice about the two parts?** (They are equal, or the same size.)

Draw another square next to the first one with a line through it creating two parts that are not equal. Ask:

- **What do you notice about this square?** (it is also divided into two parts)
- **Are both parts of the square equal or the same size?** (this time the two parts are not the same size)
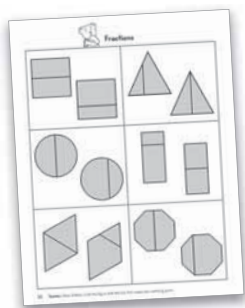
③ Equal or Not Equal

Distribute *Backpack Bear's Math Workbook #2* and instruct the children to turn to page 30.

Choose volunteers to Identify each shape. The children decide whether each shape has two equal parts, or whether they have one part that is larger than the other. They circle the shapes with two equal parts.

④ Story Problems

Ask:

- **If there are two children and one cookie what could you do so the children could share that cookie?** (You could cut the cookie in half and each child would have one half of the cookie.)
- **Do you think the cookie should be divided into two equal parts, or is it okay for one child to get a bigger piece?** (In order to be fair, the cookie should be divided into two equal parts.)
- **What if there is only one sandwich and two hungry children? What could you do so each of the children gets part of the sandwich?** (You could cut the sandwich into two equal parts.)

Choose six volunteers to stand in the front of the classroom. Instruct them to divide the group in half, or into two equal parts. The children do this. Ask: **Are the two groups equal? How do you know?**

Count the children in each group to verify they have the same number. Explain that since both groups are equal, each group is one-half of the whole group.

5 Introduce the Fraction Sign ½

Write ½ on a whiteboard. Ask: **How many groups are there now?** (two) **Right, there are two groups.**

Indicate the bottom number. The bottom number is called the denominator. It tells how many parts of the group there are. Point to one of the groups. Say: **The top number is called the numerator. It tells us this is one of the two groups. We read this number one-half.**

Repeat this procedure with an uneven number of children. After the class tries to divide the odd-numbered group in half, ask the children why it doesn't work.

Say: **When we divide an object or a group of objects in half, it means that both halves must be equal (**same size or number**). When the whole group has an odd number of objects, it can't be divided equally.**

⏩ Formative Assessment

Cookie Halves

Write "This is my half." and "This half is from _____ ." on the whiteboard.

Distribute a "Cookie Halves" worksheet to each child. Ask: **What do you notice about this cookie? (**Volunteers respond.**) Right, it has a dotted line down the middle. Why do you think that is?**

Explain: **Yes, the dotted line shows where you would cut or break the cookie in half. Use your scissors to cut the cookie in half.** The children do this.

Continue: **Now you have two halves, one to keep and one to share with a friend.**

Instruct the children to turn to a blank journal page in the back of their workbooks and glue one half of the cookie on the page. Below the cookie they copy "This is my half." from the whiteboard.

Say: **You still have one half of the cookie to share!** Each child finds another child with whom to "share" the other half of his or her cookie. When they have done so, the children return to their seats and glue the other half of the cookie on the next journal page. Below it, they copy "This half is from _____ ." from the whiteboard, and add the name of the child who gave them their half in the space. If you have an odd number of students, make one cookie half for Backpack Bear to share with the remaining child.

Magic Math Moment
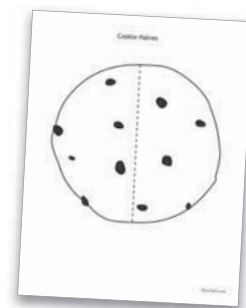
Estimation and Comparison

Materials

☐ Collection of beads or other small objects

Remove a handful of beads from the collection. Say: **Let's see how well you can estimate. How many beads do you think I have in my hand?** The children take turns estimating the number of beads. Count the beads together to check their estimations.

Choose a volunteer to remove a handful of the same objects. The children estimate the number of beads in the child's hand. Count the beads together to check their estimations.

Ask: **Which of us held more beads? How do you know?** Compare the two numbers to confirm (or correct) their responses.

Height and Length

Materials

☐ *Backpack Bear's Math Big Book*, page 41
☐ Craft sticks
☐ Connect cubes
☐ Three prepared construction paper rectangles
☐ Grid paper strips
☐ Prepared chart paper
☐ Glue sticks

Essential Question: *What can we measure?*

1 Review Height and Length

Indicate *Backpack Bear's Math Big Book*, page 41.

Say: **Backpack Bear would like to teach us how to measure how tall or high something is.**

Read: **I can use many different tools to measure how long or how tall something is.** The children identify and discuss the different tools illustrated.

2 Measure and Compare Lengths

Indicate the three construction paper rectangles. Ask: **Which two of these rectangles are the same length?**

Remind the children that in order to compare lengths, the baselines of the rectangles must be lined up evenly. (Demonstrate)

Ask: **Which rectangle is longer?** Choose a volunteer to line up the rectangles to determine the answer.

Say: **The length of an object can be divided into equally-sized smaller lengths called *units*. Say, *units*. (**Children repeat, *units*.**)**
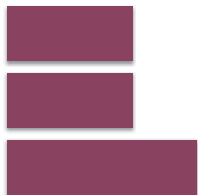
3 Measure Using Craft Sticks

Indicate a craft stick. Say: **Here is a craft stick. Let's use craft sticks as units to measure one of the rectangles.** Demonstrate how to measure one of the shorter rectangles using craft sticks. Discuss the importance of lining up the craft sticks, with no gaps or overlaps, from one end of the rectangle to the other.

Ask: **How many craft sticks long is the rectangle?**

Indicate the longer rectangle. Ask: **Who can estimate how many craft sticks long this rectangle might be? Remember when we estimate we're making a smart guess. Would you estimate that we will use more or fewer craft sticks to measure this rectangle?** A volunteer measures the rectangle to check the estimation.

4 Measure Using Cubes

Say: **Let's use a different unit of measure. We can use a connect cube.**

Indicate the craft sticks and connect cubes. Say: **Here are a craft stick and a connect cube. Are the craft sticks and connect cubes the same length? How do you know?** (Volunteers respond.**) Right, we can compare their lengths by placing them side-by-side, making sure their baselines are even. (**Demonstrate**)**

Say: **Now, look at the connect cube. If we use this connect cube as the unit of measure, do you think the rectangle will be the same number of connect cubes long as it is craft sticks long? Let's find out.** Volunteers use connect cubes to measure the length of the rectangle.

Ask: **How many connect cubes long is this rectangle?** Write "The rectangle is (number) cubes long." on a whiteboard.

Ask:

- **Did it take more craft sticks or connect cubes to measure the rectangle?**
- **Why does it take more connect cubes than craft sticks to measure the rectangle?**

Discuss the size of the different units. Lead the children to conclude that the shorter the unit of measure, the more units it takes to measure the length of an object, and the longer the unit of measure, the less units it takes to measure the length of an object.

Formative Assessment

Length of Names

Part 1

Write a long name, such as Samantha, on a whiteboard using thin, closely-spaced letters. Then write a much shorter name, such as Alex, stretching out the letters so the shorter name appears longer than the longer name. Ask:

- **Which name is longer?**
- **Which name has more letters?**

Count the letters in each name together with the children.

Ask: **If Samantha's name has more letters, why does it look shorter?** Lead the children to understand Samantha's name looks shorter because the letters are written closely together.

Continue: **Why does Alex's name look longer?** Lead the children to understand Alex's name looks longer because the letters are spread far apart.

Ask: **How can we tell for sure which name is actually longer? (**Volunteers respond.**) Right, we can write the names using letters that are the same size. Then we can measure the names to see which one is longer.**

Part 2

Display a grid paper strip on a whiteboard. Say: **Let's use the square on this grid paper as a unit of measure.** Choose a name (other than the name of a child in your class) and demonstrate how to write one letter in each square.

Ask: **How many letters are in this name?**

Distribute a grid paper strip (long enough to accommodate the child's name) to each child. Explain to the children they are to write their names, one letter in each square, on their grid strips.

Indicate the prepared chart paper. Discuss how the squares on the paper help keep the letters the same size, and reiterate why that is important.

Ask: **How can we create a chart that will order your names from shortest to longest?** Discuss.

The children use the strategies they discussed to glue their name strips in order on the chart paper.

Measuring Height

Gather the children around a classroom computer (with projection capabilities if possible) and navigate to *Starfall.com*: Geometry and Measurement, "Measurement."

Say: **Today we will learn how to measure the height of an object.**

Navigate to "tools." Say: **We will measure the height of each tool. What unit of measure should we use?** Each screen will measure using a penny, nickel, or dime. The children assist in dragging the measurement tools to determine the height of each tool.

Counting & Cardinality

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

Measurement & Data

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

MD.3 - Measure using nonstandard units.

Units of Measure

Materials
- ☐ Three prepared construction paper rectangles of varying lengths from **Day 3**
- ☐ *Backpack Bear's Math Workbook #2*, page 31
- ☐ Prepared chart paper
- ☐ Several connect cubes and craft sticks for each child or pair of children
- ☐ A classroom book to measure

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

1 Shortest to Tallest

Gather the children together. Indicate the three construction paper rectangles of varying lengths, displayed in random order.

Ask: **Who remembers when we looked at rectangles and we tried to find someone in the class with a rectangle the same length?**

Say: **Let's look closely at these rectangles and put them in order from shortest to tallest.** A volunteer arranges the rectangles in order.

Select four children of different heights to come forward. Say: **Compare your heights and arrange yourselves from shortest to tallest.** The children do this. The class gives a thumbs-up if the order is correct, or they offer suggestions for reordering the children if it is not.

Ask:

- **What if (**shortest child's name**) stands on a chair?** Assist the child to do this safely.

- **Is (**child's name**) still the shortest child in this group?**

- **What changed?**

Explain: **Right, (**child's name**) is still the shortest child in this group, but now he (**or she**) is standing on a chair, so he (**or she**) looks taller. Remember, when we measure we must measure from the same baseline.**

This activity serves as a preview for future measurement activities, which will introduce inches, feet, and conversion.

Ask: **Where is the baseline for the other three children? (**Volunteers respond.**) Right, it's the floor. (**Child's name**) must also be measured from the floor.** Assist the child down from the chair to find his or her place in the group.

Repeat this activity until all of the children have a turn. Reinforce the fact that all of the children should be measured while standing on the floor, because it is their baseline.

Formative Assessment

Measure Objects

Say: **Today we will measure objects in the classroom using two different units of measure.**

Indicate a book. Say: **Let's measure this book using connect cubes. Remember, when we measure, the connect cubes must be lined up with no gaps or overlaps from one end to the other.** A volunteer uses connect cubes to measure the length of the book.

Ask: **How many connect cubes long is the book?**

Indicate the prepared chart paper. Draw a book under "Object." A volunteer writes the number of connect cubes under "Cubes."

Say: **Now let's use a different unit of measure. We will measure this same book using craft sticks. A volunteer uses craft sticks to measure the book.** Assist if necessary to demonstrate that the sticks must be end to end.

Ask: **How many craft sticks long is the book?** A volunteer writes the number of crafts sticks under "Sticks."

Distribute *Backpack Bear's Math Workbook #2* and instruct the children to turn to page 31.

Say: **We just measured a book using connect cubes and then craft sticks. Draw a book under the word "Object."** The children do this.

Ask: **What number will you write under "Cubes?"** Volunteers respond, and the children write the number.

Continue: **How many craft sticks long is the book? Write that number under "Sticks."**

Explain: **Now you will find objects in the classroom and draw the objects under "Object." Then you will measure the object with connect cubes and record the number under "Cubes." Next you will measure the same object with craft sticks and record the number under "Sticks."**

Note: The children may work with partners, but they should record their information individually. Circulate to be sure the children are lining up their connect cubes and craft sticks properly.

Gather the children together to share their results. Ask: **Why is the number of connect cubes always greater than the number of craft sticks?** (Volunteers respond.**) Right, the connect cubes are shorter than the craft sticks, so it takes more of them to equal the length of the objects.**

Learning Centers

1 Computer

The children explore:

- Monthly calendar
- Geometry and Measurement: "Measurement"
- Geometry and Measurement: "Make Shapes"

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

Materials
☐ Computers navigated to *Starfall.com*

2 Build a Tower

The children take turns spinning the spinner and building individual towers using the corresponding number of connect cubes. With each spin, the child chooses a different color connect cube(s) to add to his or her tower.

Play continues for the duration of the learning center rotation. The children compare their towers. The child with the tallest tower wins.

Materials
☐ 1-10 game spinner
☐ Connect cubes (several different colors)

3 Measure the Objects

The children use a variety of different units of measure (cube, paper clip, dominoes) to measure pencils, books, cereal boxes and Backpack Bear. They record their results on "Learning Center Measurement" worksheets.

Materials
☐ Manipulatives to use as units of measure (connect cubes, paper clips, dominoes)
☐ Objects to measure (pencils, books, cereal boxes, Backpack Bear)
☐ "Learning Center Measurement" worksheet for each child

4 Teacher's Choice

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

Counting & Cardinality

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

Measurement & Data

A.1 - *Describe measurable attributes of objects.*

MD.3 - *Measure using nonstandard units.*

5 ## Summative Assessment: Longer/Taller

Distribute *Backpack Bear's Math Workbook #2* and instruct the children to turn to pages 32 and 33.

The children follow the directions at the bottom of each workbook page, and draw objects that are taller (page 32) and longer (page 33) than those pictured.

As the children work to complete their workbook pages, perform the following Summative Assessment individually with each child.

- Provide the children with classroom objects to measure such as a book, marker, paper, and crayon, and units of measure such as a connect cubes, dominoes and paper clips.

- Allow each child to decide which object and unit of measure he or she would like to use.

- The child measures the object.

For each child note whether he or she is able to line up the units of measure end to end, with no gaps or overlaps, to measure the object on the Summative Assessment Checklist for Unit 11, Week 25.

Week 26 Summary

This week the children will be introduced to perimeter and area. They will use their skills to predict whether various areas in their school and other classrooms are larger, smaller or the same size as theirs. They will make smart guesses to estimate area, using children as their units of measure. They will create inclines and experiment to determine what results adjustments to the inclines produce. The children will also:

- Classify measuring tools
- Match measuring tools to the people who use them
- Review subtraction facts
- Estimate surface area

Preparation

DAY 1

You will need a ramp (or a large piece of cardboard and a stack of books to create a ramp) and several toy cars. You will also need a variety of objects for the children to roll down the ramp.

DAY 2

The children will use two yardsticks for today's Magic Math Moment.

You will need a puzzle with enough pieces so that each child or set of partners has one piece.

The children will "tour" several areas or classrooms in your school for the purpose of comparing their areas to that of your classroom. Prepare a sheet of chart paper (to resemble the one pictured) with three columns labeled Area/Room, Prediction and Actual. The children will list the names of the rooms in the first column prior to their tour.

The children predict how each room or area compares with their own, using the words *same, larger,* and *smaller*. They will not actually measure the rooms. As they visit the other rooms they will discuss their findings.

Area/Room	Prediction	Actual
Cafeteria		
Bathroom		
Library		
Office		
Playground		
Gym		

DAY 3

You will need one large sheet of paper or a sticky note, and one small sticky note.

Duplicate a copy of the "Which Window is Bigger?" worksheet for each child. Prepare a set of windows to use for demonstration.

You will also need a set of 24 one-inch tiles, connect cubes or one-inch paper squares for each child.

DAY 4

You will use the Subtraction Equation Cards that are minus 1 in today's Magic Math Moment.

Prepare a "Mystery Box" by placing the Measuring Tools Picture Cards inside.

Prepare 5 sentence strips with the name of one measurement category (length/height, weight, capacity, time, temperature) on each strip.

DAY 5

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

Activity Center 2 — Duplicate a Measuring Tiles worksheet for each child. The children will also use a die and crayons.

Activity Center 3 — The children will use 4 math mats that have been labeled with the measurement categories length/height, weight, capacity, time and temperature, or you may use the prepared sentence strips to label the math mats.

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

Summative Assessment — The children will find the area of a game board by cutting apart the tiles and gluing them on top. They will need pencils, scissors, and glue sticks.

Duplicate a "Measuring Surface Area" worksheet and a Measuring Tiles worksheet (as used previously) for each child.
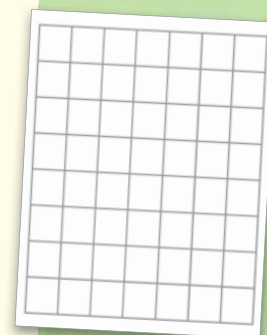
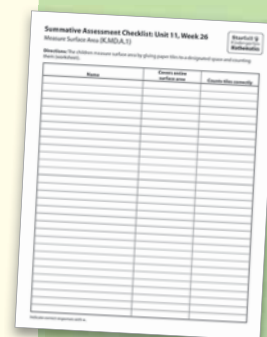Prepare a copy of the Summative Assessment Checklist for Unit 11, Week 26.
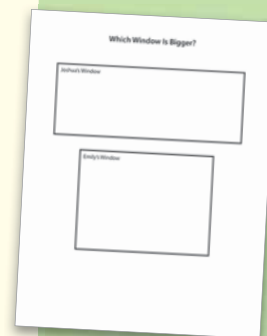
Which Window Is Bigger?
Worksheet

"Measuring Surface Area"
Worksheet

Measuring Tiles Worksheet

Summative Assessment
Unit 11 - Week 26

	DAY 1	DAY 2
Daily Routines	• Calendar • Place Value • Weather • Hundreds Chart • Number Line	
Magic Math Moment	Missing number	Number ranges
Math Concepts	Solve equations by providing the missing number Measure how far toy cars roll down inclines Experiment with height of inclines	Name numbers that come between two other numbers Introduce Perimeter and Area Predict and compare room area (larger, smaller, same)
Formative / Summative Assessment	Create ramps (inclines) and experiment with their heights	Discuss reasons for variations in room areas
Workbooks & Media		

DAY 3	DAY 4	DAY 5
• Calendar • Place Value • Weather • Hundreds Chart • Number Line		

Learning Centers

DAY 3	DAY 4	Learning Centers
Estimate surface area	Subtraction flash cards	**1** *Starfall.com:* • Monthly Calendar • Geometry & Measurement: "Measurement," Add & Subtract: "Subtraction Practice," and "Make 10"
Review positional words Compare surface area Estimate area of a classroom space (smart guesses)	Review subtraction facts Match measuring tools to their uses Classify measurement tools	**2** Toss and Color
Measure surface area	Match measuring tools to the people who use them	**3** Categorize Measurement Picture Cards
		4 Teacher's Choice
Starfall.com: Geometry & Measurement, "Make Shapes" "Which Window is Bigger?"		**5** Summative Assessment: Measure the surface area of a game board Grid Paper Worksheet "Measuring Surface Area" Worksheet

Magic Math Moment

Missing Number

Write the following equations on a whiteboard. The children recall strategies they can use to determine the missing numbers, then use the strategies to solve the equations.

- $5 + \underline{\qquad} = 9$
- $10 = 6 + \underline{\qquad}$
- $3 + \underline{\qquad} = 8$
- $\underline{\qquad} + 6 = 6$

Operations & Algebraic Thinking

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

Measurement & Data

MD.3 - Measure using nonstandard units.

Measure Distance

Materials
☐ Toy cars
☐ Cardboard and a stack of books (or a ramp)
☐ Masking tape
☐ Connect cubes
☐ Objects to roll down the ramps (marbles, pencils, dice, crayons)

1 How Far Will It Roll?

Say: **Today let's measure how far a toy car will roll down a ramp!**

- Create an incline or ramp using a piece of cardboard and a short stack of books
- Indicate the end of the incline with a strip of masking tape.
- Release a toy car at the top of the incline, and the children watch it roll.
- Mark the car's stopping point with another small piece of masking tape.
- Use connect cubes to measure the distance between the two pieces of masking tape.

Engage the children in a discussion about the demonstration. Ask: **What could we do to cause the toy car to roll farther?**

The children experiment and should realize that if the incline is raised, the car will roll faster and farther.

- **What would happen if we used something other than a toy car?**
- **Do you think it would roll as far? Why or why not?**

Volunteers increase the incline and choose different objects to roll down the ramp. Repeat the above activity then discuss how the results differed from the initial demonstration.

Formative Assessment

Measure in Groups

Divide the class into several small groups.

Provide the groups with materials to build ramps, strips of masking tape, and objects to roll such as balls, pencils, small cars, and dice. The groups each build their own ramps and experiment, rolling various objects down the ramps and measuring how far they roll.

Gather the children to share their experiences.

Magic Math Moment

Number Ranges

Materials

☐ 2 yardsticks

Say: **Let's see if you can find a number that is between two other numbers. Use the Classroom Number Line as a strategy to find the answer. Ready? Name a number between:**

- **0 and 10**
- **11 and 20**
- **21 and 30**
- **31 and 40**

If the children need assistance to answer, two classmates point yardsticks at the first and last numbers of each pair to define the range.

Classroom Size Comparison

Materials

☐ Jigsaw puzzle piece for each child or pair of children

☐ Paper, pencil

☐ Prepared chart paper

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

1 Introduce Perimeter and Area

Gather the children in a circle and display pieces of a jigsaw puzzle.

Ask: **Would you like to know a quick way to put together a puzzle? Put all the pieces with flat edges together to make a "frame" for the puzzle first then work to put the inside of the puzzle together.**

Distribute a puzzle piece to each child.

Say: **Children who have a puzzle piece that has at least one flat edge bring it to the center of the circle.** Assist the children in putting together the frame of the puzzle.

Say: **Now we have the frame. Mathematicians call this a *perimeter*. Say, *perimeter*.** (Children repeat, *perimeter*.) **The perimeter is the distance around the outside of a shape.** Indicate the perimeter of the puzzle.

Continue: **If you still have a puzzle piece, place it inside the puzzle.** If there is time, assist the children to put the puzzle together. If you do not have time to complete the puzzle, explain that if all these pieces were put together they would form the inside of the puzzle.

Say: **The *area* is the amount of space inside the shape. Say, *area*.** **(**Children repeat, *area*.**)**

2 Room Area

Say: **Long ago children went to school in one-room schoolhouses. It didn't matter what grade the children were in. They could be in kindergarten or fifth grade. There was only one room where all the children learned together. Does our school have just one classroom for all the children?** (Volunteers respond**.) Right, in our school each grade has its own classroom. Why don't we have one-room schoolhouses anymore?** Allow the children to briefly discuss.

Explain: **Our school is divided into many different spaces, or areas. Area means the space of an object or room. Take a look around our classroom. The space inside the walls of our classroom is the area in which we work. I wonder if the other rooms, or areas, in our school are the same size as our classroom, or if they are bigger or smaller than our classroom.**

3 Introduce the Prediction Chart

Indicate the prepared prediction chart and discuss the columns.

Say: **Let's make a list of all the different areas or rooms in our school. Then we will predict if each one is, larger, smaller, or the same size as our classroom.** Write the areas or classrooms, along with predictions as volunteers suggest them. Assist as necessary.

Take the prediction chart and a pencil with you as you lead the children on a tour of the school. Walk outside and visit the playground area if the weather permits.

As you visit each room or area, the children assist to write larger, smaller, or same in the "Actual" column on the prediction chart.

Note: The children do not actually measure the areas of the spaces recorded.

When you return to your classroom, use the chart to recall and discuss the results.

Say: **When someone builds a school, he or she must think about how big each area or space should be.**

Formative Assessment

Size Questions

Ask the following questions to assess whether or not the children understand this lesson.

- **Are all the rooms in our school the same size? How can we tell?**
- **What would happen if all the rooms in our school were the same size?**
- **Why is the cafeteria area larger than our classroom?**
- **Why are the bathrooms smaller than our classroom?**
- **Is there a space or room size you would change? Why or why not?**

Estimating Surface Area

Navigate a classroom computer with projection capabilities to *Starfall.com*: Geometry and Measurement, "Make Shapes."

Volunteers use this activity to review positional words and to practice using shapes to fill in surface area space. Prior to each online activity, the children estimate how many of the shapes it will take to fill in the surface area.

Note: If you are unable to project *Starfall.com*, gather the children around a classroom computer for this activity.

Measurement & Data

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

MD.3 - Measure using nonstandard units.

Geometry

A.1 - Describe objects using shapes and relative positions.

B.6 - Compose simple shapes to form larger shapes.

Comparing Surface Area

Essential Question: *Why is making predictions important?*

1 Review Area

Distribute a sheet of drawing paper to each child.

Say: **Use a pencil to draw a circle and a rectangle on your paper. After you have done that, color the space inside the circle and the rectangle with a crayon.** The children do this.

Say: **Point to the circle.** Check to see that the children are pointing correctly to the circle.

Say: **The part you colored is called the area of the circle. Now, point to your rectangle.** Check to see that the children are pointing correctly to the rectangle.

Continue: **The part you colored inside the rectangle is called the area of the rectangle. The space inside a figure is called its *area*. Say, *area*.**

2 Compare Area

Display a large sticky note or sheet of paper and a small sticky note side-by-side.

Ask: **If we want to write a note to the principal, and we have a lot to say, which sticky note should we use? (**Volunteers respond**.) Why?** Discuss the fact that the large sticky note or sheet of paper has a larger surface area—the flat area, which is used for writing. Because the surface area is larger, you can write more on it than on the small sticky note.

③ Measure an Area of the Classroom

Gather the children where they can easily see the rug area or a defined space (outlined with masking tape).

Ask: **How many children lying end-to-end and side-by-side would it take to fill this space? Let's make an estimate. Remember, when we make an estimate, we are making a smart guess.**

- **Would it take 100 children to fill the space?**
- **Would one child fill the space?**

Explain: **No, these are not smart guesses. We know that 100 children would be too many to fit in the space, and 1 child wouldn't be enough. Raise your hand if you can make a smart guess.**

Write several of the children's estimates on the whiteboard. Continue: **Now it's time for us to find out!**

Select a volunteer to make a tally mark on the board to represent each child as he or she lies down. Children lie down one-by-one, end-to-end, and side-by-side to fill the defined space.

Say: **We estimated that it would take about (**children's estimate**) children to fill this area. The actual or real number of children is (**actual count**). Were our estimates too high or too low?** Discuss.

④ Measure Windows

Indicate the prepared window cutouts. Say: **Look at these two windows. One belongs to Joshua and one belongs to Emily. Which window has the bigger surface area?** Discuss the children's responses, but do not give the answer.

Turn the windows in different directions so the children can see them in various positions. Ask: **Now, which window has the bigger surface area?** Discuss, but do not give or confirm the correct answer.

Distribute a "Which Window is Bigger?" worksheet to each child. The children cut out the two windows. They partner to discuss which window is bigger and why. Gather the children to share their answers.

Say: **If we really want to know which window is bigger, we must figure out which window has the bigger surface area, or inside part. What tools could we use to measure which window has the bigger surface area?**

Formative Assessment

Use Measuring Tools

Distribute twenty-four one-inch tiles, connect cubes or one-inch paper squares (cut from construction paper) to each child.

Say: **You will use your tiles (**connect cubes or paper squares**) to measure the two windows.**

The children use their tools to measure the windows and discover that both shapes have the same surface area.

Ask: **How can both windows have the same surface area when they are not the same shape?** Discuss.

Shape does not affect the total amount of surface area. This is a very difficult concept for many primary learners. This lesson provides concrete, hands-on experiences to introduce this concept

Subtraction Equation Cards

Say: **Let's review subtraction facts to see how well you remember them. I will flash Subtraction Equation Cards. As soon as you know the answer, hold up the correct number of fingers. Ready?**

Repeat the Subtraction Equation Cards (-1) as time allows.

Operations & Algebraic Thinking

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

Measurement & Data

MD.1 - Identify and use measurement tools.

Measurement Tools

Materials

☐ Prepared "Mystery Box"

☐ Measurement Tools Picture Cards

☐ Pocket chart

☐ Prepared sentence strips

☐ "People Who Measure" Picture Cards

1 Mystery Box

Gather the children in a circle and indicate the closed "Mystery Box" with the Measurement Tool Picture Cards inside.

Say: **Here is a "Mystery Box." It has pictures of measurement tools in it. We will try to solve the mystery of what each measurement tool is used to measure. Ready?**

Choose volunteers to draw Picture Cards from the mystery box and show them to the class. Discuss their uses then the volunteers place the Picture Cards in a pocket chart.

Continue until all of the cards have been discussed.

2 Classify Measurement Tools

Divide the children into 5 groups.

- Read the sentence strips one at a time and distribute them to the different groups of children.
- Each group reads its sentence strip back to you.
- Indicate a "Measurement Tool Picture Card" and the group to which it belongs stands and holds up its sentence strip.

Repeat for each Measuring Tool Picture Card.

Collect the sentence strips.

Formative Assessment

People Who Measure

Say: **Look at the pictures of measuring tools in the pocket chart. I will hold up pictures of people who use measuring tools. You will partner and discuss which of the tools in the pocket chart each person uses in his or her job.**

Instruct the children to partner and sit knee-to- knee. Show a People Who Measure Picture Card and identify it. Allow time for the partners to discuss. Volunteers raise their hands to share.

Repeat for each People Who Measure Picture Card.

Learning Centers

1 Computer

The children explore:

- Monthly calendar
- Geometry and Measurement: "Measurement"
- Add & Subtract: "Subtraction Practice"
- Add & Subtract: "Make 10"

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

Materials
- ☐ Computers navigated to *Starfall.com*

2 Toss and Color

The children take turns to toss a die and color the corresponding number of squares on his or her grid paper. Play continues until one child covers the entire area of his or her grid or until each child has colored the entire area.

Materials
- ☐ Measuring Tiles worksheet for each child
- ☐ Crayons
- ☐ Dice

3 Categorize Measurement Picture Cards

The children place the math mats on the floor and stack the Measurement Tools Picture Cards face down. They take turns to reveal the Picture Cards and identify the pictures. The children explain how the measurement tools could be used, then sort the Picture Cards by placing them on the correct math mats.

Materials
- ☐ Measurement Tools Picture Cards
- ☐ 5 Math mats labeled with measurement categories: length, height, weight, capacity, time, and temperature

4 Teacher's Choice

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

5 Summative Assessment: Measure Surface Area

Children will find the area of the "Measuring Surface Area" worksheet by cutting apart the tiles and gluing them to the top of the worksheet. After they glue the tiles, they number each tile with a pencil then write the number of tiles it took to cover the game board

Observe and record observations on the Summative Assessment Checklist for Unit 11, Week 26.

Materials
- ☐ "Measuring Surface Area" worksheet for each child
- ☐ Pencils, scissors, glue
- ☐ Measuring Tiles worksheet for each child
- ☐ Summative Assessment Checklist (Unit 11, Week 26)

Counting & Cardinality
B.4 - Understand the relationship between numbers and quantities.

Operations & Algebraic Thinking
A.1 - Represent addition and subtraction in a variety of ways.

Measurement & Data
MD.1 - Identify and use measurement tools.

MD.3 - Measure using nonstandard units.

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 ❶

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 ❷

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 ❸

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 • Place Value • Weather • Hundreds Chart • Number Line	
Magic Math Moment	Addition and Subtraction Equation Cards	Comparing size and weight
Math Concepts	Distinguish plus and minus signs Weigh objects Lighter and heavier	Explore connection between weight and size Weighing objects 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 ❸	DAY ❹	DAY ❺
• Calendar • Place Value • Weather • Hundreds Chart • Number Line		

DAY ❸	DAY ❹	
Numbercise	Number Line plus and minus	**1** *Starfall.com:* • Monthly Calendar • Geometry & Measurement: "Weight," and "Puzzles"
Perform exercises to equal plus and minus 1 problems Introduce capacity Match containers to what they measure (capacity) Compare containers of varying sizes Capacity estimation	Find the number that is plus 1 or minus 1 Measurement review "Guess the Measuring Tool" Introduce "A Walk in the Park" (Variation)	**2** Measuring Weight **3** "A Walk in the Park" (Variation)
Discussion of containers that took most/least cups to fill	Measurement review	**4** Teacher's Choice
Backpack Bear's Math Big Book, page 42	Workbook p. 35	**5** Summative Assessment: Measuring Capacity

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.

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?

Materials

☐ A book for each child

☐ *Backpack Bear's Math Workbook #2*, page 34

☐ Prepared chart paper

☐ Measuring cups

☐ Pan balance

☐ Ruler

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

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.

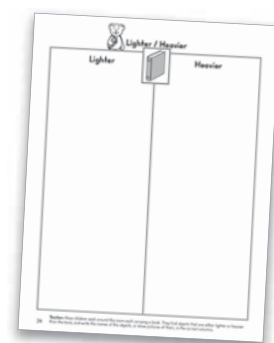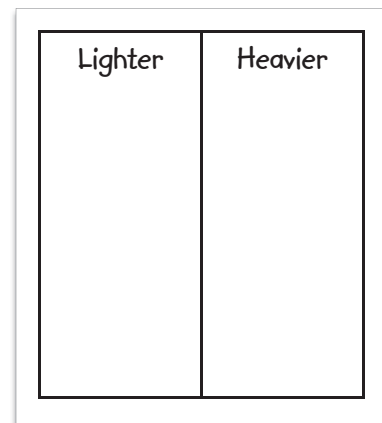| Lighter	Heavier

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 heaver 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.

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.

Magic Math Moment

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?**

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!**

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.

Magic Math Moment

Numbercise (+1/-1)

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.

Magic Math Moment

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.

Measurement Review

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

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?**

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

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.

Measurement & Data

MD.1 - Identify and use measurement tools.

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

2 Measuring Weight

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)

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.

3 "A Walk in the Park" Variation

Materials

☐ "A Walk in the Park" game board

☐ Game spinner numbered 1-5

☐ Playing pieces

☐ Measuring Tools Picture Cards

- 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.

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

Cookie Halves
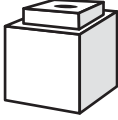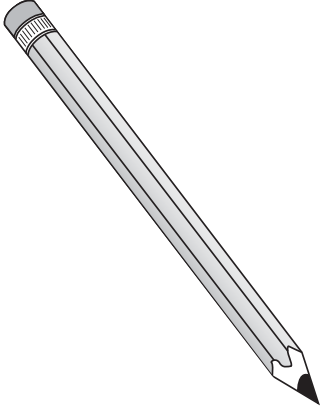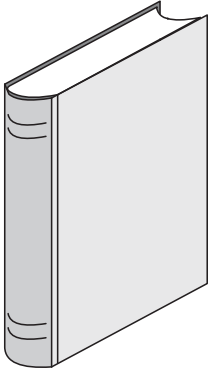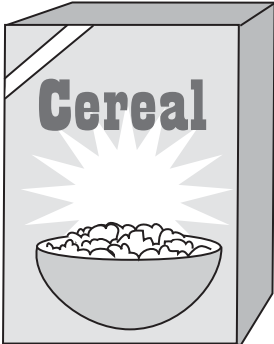
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Grid Paper

Name:_____ **Starfall®**

Learning Center Measurement Worksheet

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

Measuring Surface Area

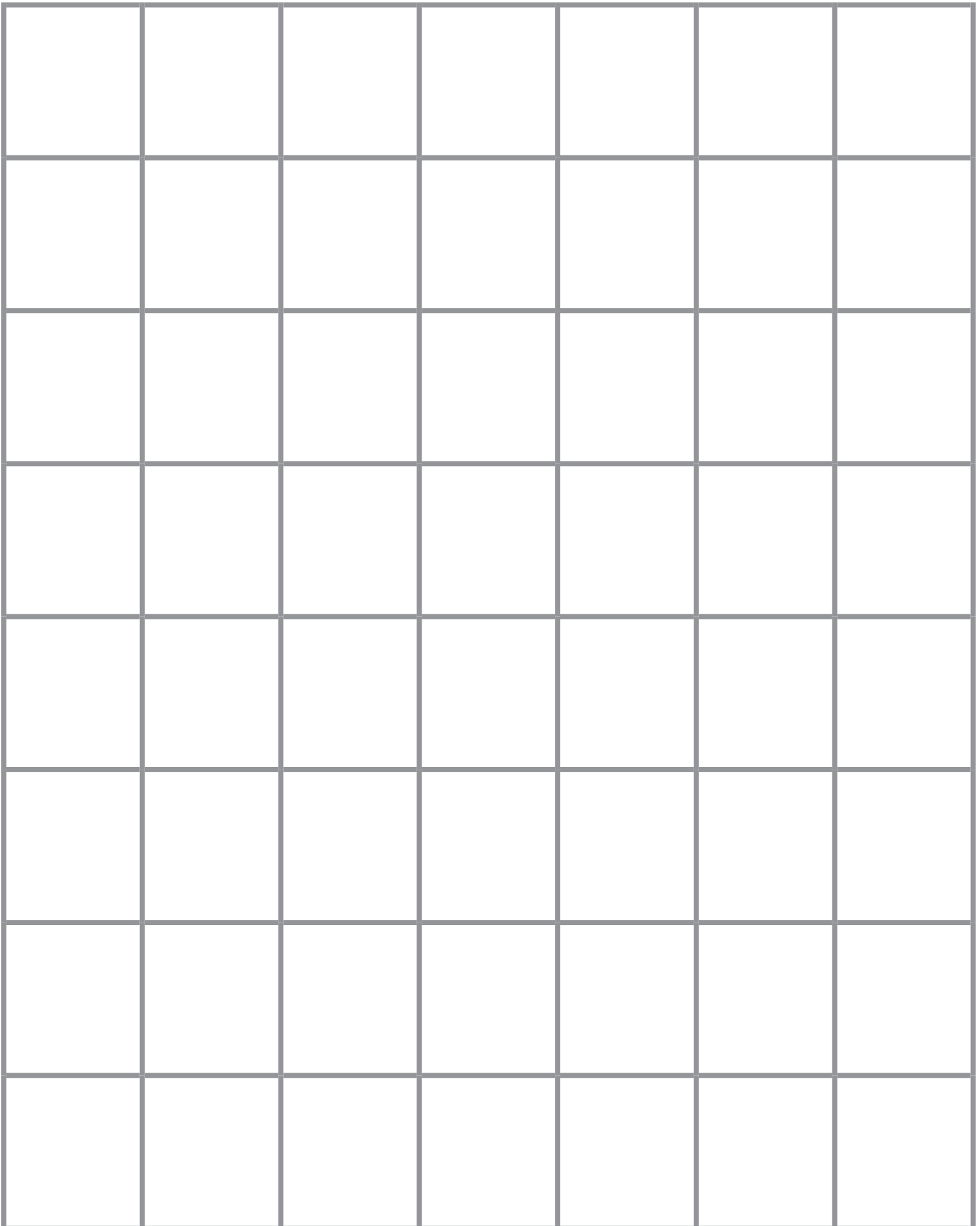**I will measure this object:**

The measuring tool I will use is:

Estimation: How many tools do I think it will take to cover my object?

_____

Result: It took this many tools to cover my object:

_____

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Measuring Tiles

Which Window Is Bigger?

Joshua's Window

Emily's Window