Building Skills with Brick Math
An 8-Day Program to Sharpen Basic Math Skills

Advanced Measurement & Geometry

Program Overview

During this **Building Skills with Brick Math** program, students dive deeply into advanced measurement and geometry. They use a variety of learning techniques including manipulatives, drawing, verbal explanation, physical movement, and song. Students work with a partner, use the vocabulary fluently in math conversations, and assess themselves on their abilities.

The program is written in the following daily format:

1. Introduction to the topic
2. Teacher and students work together on the new concepts
3. Student practice
4. Movement related to concepts
5. Student independent practice
6. Content assessment
7. Story problems
8. Self-assessment on content and partnering

The Brick Math program is successful because students transfer knowledge from using manipulatives to drawing and verbal explanations.

Take the time your students need to learn each concept. Some classes will find one concept easily learned and a second concept much harder, requiring a slower pace. If all the daily activities are not completed during a session, you can choose to move the remaining activities to the following day or truncate an activity if you feel the students have fully learned the math concepts.

Day 1	**Discovering the Formula for Perimeter** • Find the perimeter of regular and irregular shapes • Discover the formula for perimeter	**Vocabulary** • Perimeter • Polygon • Regular polygon • Irregular polygon • Sum
Day 2	**Discovering the Formula for Area** • Find the area of regular and irregular polygons • Discover the formula for area • Decompose shapes to find the area	**Vocabulary** • Area • Dimensions • Polygon • Regular polygon • Irregular polygon
Day 3	**Real-World Problems for Area and Perimeter** • Use area and perimeter in real-world scenarios • Decompose shapes • Use mathematical vocabulary related to area and perimeter	**Vocabulary** • Perimeter • Polygon • Regular polygon • Irregular polygon • Sum • Area
Day 4	**Relationships between Area and Perimeter** • Discover how changing the perimeter affects the area in rectangular shapes	**Vocabulary** • Perimeter • Polygon • Regular polygon • Irregular polygon • Sum • Area

Day 5	**Surface Area** - Define surface area - Determine the surface area of a rectangular prism	**Vocabulary** - Face - Perimeter - Polygon - Regular polygon - Irregular polygon - Sum - Surface Area - Three-dimensional (3D) shape - Rectangular prism - Cuboid - Cube
Day 6	**Volume** - Use prior knowledge about 3D shapes to determine length, width, and height - Discover the formula for volume - Find a missing dimension for a volume word problem	**Vocabulary** - Face - Perimeter - Polygon - Regular polygon - Irregular polygon - Sum - Surface Area - Three-dimensional (3D) shape - Rectangular prism - Cuboid - Cube - Volume

Day 7	**Relationship Between Surface Area and Volume** • Discover what happens to volume when dimensions are changed in the surface area of a rectangular prism	**Vocabulary** • Face • Perimeter • Polygon • Regular polygon • Irregular polygon • Sum • Surface Area • Three-dimensional (3D) shape • Rectangular prism • Cuboid • Cube • Volume

Common Core Math Standards addressed:

CCSS.MATH.CONTENT.3.MD.A.1
Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

CCSS.MATH.CONTENT.3.MD.A.2
Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[1] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.[2]

CCSS.MATH.CONTENT.3.MD.B.4
Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Recognize area as an attribute of plane figures and understand concepts of area measurement.
CCSS.MATH.CONTENT.3.MD.C.5.A
A square with a side length of 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

CCSS.MATH.CONTENT.3.MD.C.5.B
A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

CCSS.MATH.CONTENT.3.MD.C.6
Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
CCSS.MATH.CONTENT.3.MD.C.7

Relate area to the operations of multiplication and addition.

CCSS.MATH.CONTENT.3.MD.C.7.A
Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

CCSS.MATH.CONTENT.3.MD.C.7.B
Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

CCSS.MATH.CONTENT.3.MD.C.7.C
Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

CCSS.MATH.CONTENT.3.MD.C.7.D
Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.

Geometric measurement: recognize perimeter.
CCSS.MATH.CONTENT.3.MD.D.8
Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

Solve problems involving measurement and conversion of measurements.
CCSS.MATH.CONTENT.4.MD.A.1
Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...*

CCSS.MATH.CONTENT.4.MD.A.2
Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

CCSS.MATH.CONTENT.4.MD.A.3
Apply the area and perimeter formulas for rectangles in real-world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor*.

Represent and interpret data.

CCSS.MATH.CONTENT.4.MD.B.4
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection*.

Convert like measurement units within a given measurement system.
CCSS.MATH.CONTENT.5.MD.A.1
Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.

Represent and interpret data.
CCSS.MATH.CONTENT.5.MD.B.2
Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally*.

Geometric measurement: understand concepts of volume.
CCSS.MATH.CONTENT.5.MD.C.3
Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

CCSS.MATH.CONTENT.5.MD.C.3.A
A cube with a side length of 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

CCSS.MATH.CONTENT.5.MD.C.3.B
A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.

CCSS.MATH.CONTENT.5.MD.C.4
Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

CCSS.MATH.CONTENT.5.MD.C.5
Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving volume.

CCSS.MATH.CONTENT.5.MD.C.5.A
Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

CCSS.MATH.CONTENT.5.MD.C.5.B
Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

CCSS.MATH.CONTENT.5.MD.C.5.C
Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.

Note: If your school uses other standards, please refer to these standards as a guide.

Materials Needed
- Brick Math Advanced Measurement & Geometry Teacher Edition book
- Brick Math Advanced Measurement & Geometry Student Edition book (one per student)
- Brick Math brick sets – (one per student or one per pair of students)
- Math journal - can be created from lined paper stapled together with a tagboard cover or a spiral notebook (one per student – will be used daily)
- Chart paper
- Markers (one set per student or pair of students)
- Colored pencils or crayons (one set per student or pair of students)
- Tape that can be placed on the floor and removed
- Pencils (one per student)
- Cardstock (one per student)
- Dice (one die per student)
- Optional: Foam sheets or shelf liner cut into rectangles approximately 12" x 18" (one sheet per student)

Before the first day:
1. Read the Introduction and How to Teach with Brick Math on pages 5-19 in the *Advanced Measurement & Geometry Teacher Edition.*
2. Label all the Brick Math brick sets your students will use. Choose a system such as Set 1, Set 2, Set 3, etc., or Zebra, Elephant, Tiger, etc.
3. Assign one brick set to each student or pair of students. They will use this same set every day. This materials management step allows the students to be responsible for their pieces. At the end of each day, the students will inventory one compartment of bricks in the box at your direction.
4. Students will need the following supplies:
   - One Brick Math Advanced Measurement & Geometry Student Edition book per student. If you are using PDFs, you will need to make copies of all the specific pages in each day's lesson so students can correctly show and explain their work and make the knowledge transfer from manipulatives to drawings and verbal explanations.
   - Colored pencils or crayons (one set per student or pair of students)

- Student journals you have prepared (one per student)
- Optional: One foam sheet or shelf liner cut into a 12" x 18" rectangle per student. These sheets help keep the bricks from sliding off desks and tables.

Note: There are blank baseplate paper templates on pages 77-79 in the Advanced Measurement & Geometry Teacher Edition book. They may be helpful for the daily story problem activities. Make additional copies of blank baseplate paper as needed.

Day 1 – Discovering the Formula for Perimeter

Welcome

Tell the students something similar to the following:

> *Welcome! We are going to do a lot of interesting activities this week. We are going to build with LEGO® Bricks, work with a partner, create a team name, exercise with numbers, and more. Are you ready to get started?*

Show the students a Brick Math brick set.

Say:

> *First, I want to show you the brick set. What colors do you see? Each color has a name. Each of you has a name. We need to learn all the names of the people in our class and the names of the bricks. I would like you to sit in a large circle. Each person will say his or her name. Then, please choose one piece from the set. Tell us which color piece you chose and something about the piece.*
> *I will start.*
> *My name is _____. I chose a purple brick because purple is the same color as my favorite flower.*

Go around the room with the brick set so each student can select a brick. After each person has said his or her name and chosen a brick, have the class repeat the names. For example: "Mrs. Smith, Paula, Alan, Rebecca." Then, if the next child is Ben, you would all say together: "Mrs. Smith, Paula, Alan, Rebecca, Ben." When all the students have said their names, have the students who chose a particular color stand with their bricks in their hands.

Say:

> *Everyone who chose a purple brick, please stand. Let's see if we can remember their names. Together, let's say the names of the children who are standing.*

Say all the students' names, then have them sit down. Continue with different colors until all the children have stood and been called by name.

Look at the shapes of the bricks chosen. Explain to the students how the shapes also have names.

Explain to students how to name the bricks. Start with your brick. Perhaps you chose a 2x2 brick. Show students your brick. If you want, pass it around.

Say:

> This is called a 2x2 brick because it is a square with 2 studs or bumps on one side (width) and 2 studs or bumps on another side (length).

Show students a 1x1 brick.
Say:

> Can you guess what this brick is called? It has 1 stud in width and 1 stud in length – but it has a total of only 1 stud.

Make sure students understand that it is a 1x1 brick. Then show students a 1x6 brick. Continue to go through the bricks until students can do a good job of naming the bricks.
Ask the students to go around the circle and tell the name of the brick they chose. If a student is not sure or names it incorrectly, ask the student to count the width and length in studs, then help with the correct name.

When all the bricks have been named, ask the students to put the bricks into the proper location in the set. Their pieces should match the compartment or area in the container so the brick "family" will be all together.

Math Journals

Give each student a journal. Tell students they will be using the math journal every day. Give students 5-10 minutes to decorate the covers with markers or colored pencils.

Tell students that they will be working with a partner during the program and that they can learn from each other.
Say:

> Are you ready to work with a partner and do some fun building while you learn about measurement?

Working with a Partner

Ask students their favorite thing about working with a partner. Then ask them what is the best way to work with a partner. Help students create answers like the following:

- Partners share the work, but neither person does the other one's work.

- Partners learn together and can help each other learn.

- Partners communicate (talk) kindly with each other.

- Partners care about each other.

- Partners do not give each other the answers but help the other person understand how to find an answer.

Create a set of Partner Rules and put them on chart paper and display them in the classroom so you can refer to them as needed.

Choose two students to be partners and assign them a place to sit at desks or tables. Students of the same ability level tend to work well together. Have each set of partners move to that location as you assign them. Give the pair of students their Brick Math materials (either one set for two people or one set per person.) Tell each group that they always get set #X when it is time to gather materials. Tell the class that each team is responsible for all the bricks being returned to the set every time the set is used.

When all the students have their sets, give every student a 20x20 baseplate.

Say:

> *You will work together every day. Being a partner is an important responsibility. You need to help one another and be kind to your partner.*

Students take bricks from the divided box as needed.

Discovering the Formula for Perimeter
Part 1: Show Them How
Students complete Part 1 on page 5 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 12-13 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #1, 1-4. Students complete pages 5-6, Problem 1, #1-3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 13-14 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #2, 1-5. Students complete pages 6-7, Problem #2, 1-5 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 14 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #3, 1-2. Students complete page 8, Problem #3, 1-2 in the Brick Math Advanced Measurement & Geometry Student Edition.
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Move with Perimeter

Time for some movement! Have all students stand and create a rectangle with a student as a unit of measure. For example, 12 students might arrange themselves as 4 lengths and 2 widths for a perimeter of 12. Ask the students to determine the side measurements and the perimeter.

Now, ask the students to create an irregular shape, where some students hold one or both arms out the sides to represent either 2 or 3 units, respectively. Ask the students to determine the perimeter.

Ask students to create the largest perimeter possible and then determine the perimeter. [All students have both arms out to the sides.]

Ask students to find their partners and return to their desks/tables.

Part 2: Show What You Know

Read aloud the instructions for Part 2, #1 on page 15 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 9, Part 2, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #2 on page 16 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 10-11, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #3 on pages 17-18 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 12, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #4 on page 19 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 13, #4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment
Tell students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 14 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 14 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not change their partner's model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on page 15 in the Brick Math Advanced Measurement & Geometry Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Students complete Assessment #4 on page 15 in the Brick Math Advanced Measurement & Geometry Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Story Problem
Tell students a story problem like the following:
Juan and Antonio are building a raised-bed garden for their neighbor, Mrs. Gonzalez. The need to buy the correct amount of materials. She would like a garden that is 4' x 8'. What will be the perimeter of the garden? [4 + 4 + 8 + 8 = 24 feet]

Students use their brick sets and journals to answer the story problem.

Have each pair work together to create a new story problem using brick models. Have students write the story problem they have created in their journals.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x2 bricks from the box and count them. After the students have verified the number (30), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Remind students about the partner's rules they created earlier today. Refer to the Partner's Rules Chart to refresh their memories.

Ask students to use the journals. Students need colored pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:
Say:

> *I need to work on being a better partner. I did not listen to and help my*
> *partner as I should have.*
> *If this describes you today, draw an orange brick after the word "partner."*
>
> *I was a good partner today. I helped my partner but sometimes I did their*
> *work for them or I let them do my work.*
> *If this describes you today, draw a green brick after the word "partner."*
>
> *I was a very good partner today. I helped my partner by checking their work*
> *and not by doing their work.*

If this describes you today, draw a blue brick after the word "partner."

Ask students to write "*I can determine perimeter*" in their journals.
Students should draw a specific color brick after the words "*I can determine perimeter*" based on the following self-assessment.
Say:

I need help determining the perimeter. If this describes you today, draw an orange brick after the words "I can determine perimeter"."

I can determine perimeter". If this describes you today, draw a green brick after the words "I can determine perimeter"."

I can help others determine perimeter". If this describes you today, draw a blue brick after the words "I can determine perimeter"."

Day 2 – Discovering the Formula for Area

Preparation:
- Read page 20 and the top of page 21 in the Brick Math Advanced Measurement & Geometry Teacher Edition
- Have a rectangle drawn on chart paper or the board with measurements for use during the welcome.
- Dice will be needed – one die per student.
- Have one sheet of tagboard or cardstock for each pair of students

Welcome
Welcome students back to day 2 of Building Skills with Brick Math.
Ask students to welcome their partners and tell them that they look forward to working together.

Ask students if they can remember how to determine the perimeter. Show students the rectangle you have drawn on chart paper or the board and ask them to determine the perimeter and explain how the formula they used.

Tell students that today they will create team names and draw some shapes.
Have students team up with their partners and get colored pencils or crayons and one cardstock or tagboard sheet per team.

Show students an example of a team name and a shape.
Example: All Stars and a 5' x 7' rectangle
Partners work together to determine a team name and then write the name in the middle of the sheet. Partners should create a rectangle and the measurements and then determine the perimeter. Be sure to include units!

Working with a Partner
Remind students of the partner rules created on Day 1. Have students share one good thing they saw a partner do yesterday.

Have students get their assigned brick set(s) and 2 baseplates for their team.

Area
Ask students what the perimeter of a shape is. [the measurement of the outside edge]
Show students the rectangle from "welcome" and draw attention to the inside of the shape.

Ask students if they know the term for the measurement of the inside of a shape. [area]
Ask students if the perimeter is measured in feet, what area might be measured in? [square feet]

Have students return to their desks/tables with their partners.

Part 1: Show Them How
Follow the instructions on pages 21-23 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #1, 1-6. Students complete pages 16-18, Problem #1, 1-6 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 23 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #2, 1-5. Students complete pages 18-19, Problem #2, 1-5 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 24-25 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #3, 1-3. Students complete pages 20-21, Problem #3, 1-3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Move with Area
Have students choose a person to work with who is not their regular partner. Students choose who is Partner A and who is Partner B. Partner A is the width and Partner B is the length. Each team needs two dice. Each partner rolls the dice to determine a length or width. Students write the length and width of the rectangle in their journals and determine the area. Partner B determines the unit of measure – feet, inches, centimeters, meters, etc.

Students change partners are repeat the activity 3 times.

Students find their partners and return to their desks/tables.

Part 2: Show What You Know
Read aloud the instructions on page 26, #1 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 22, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions on page 26, #2 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 22, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions on page 27, #3 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 23, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions on page 27, #4 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 24, #4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions on pages 27-28, #5 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 25, #5 in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment

Remind students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 26 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 26 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not change their partner's model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on page 26 in the Brick Math Advanced Measurement & Geometry Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Students complete Assessment #4 on page 27 in the Brick Math Advanced Measurement & Geometry Student Edition. Ask partners to check the work. Walk around the room and check students' work.

Story Problem

Tell students a story problem like the following:

> Julia needed an area on the playground that was at least 56 square feet to use for the students who wanted to jump rope. What dimensions could be used to give Julia the area she needs? [Ask students to determine as many correct possibilities as they can. 7' x 8' or 8' x 7' or 4' x 16' or 16' x 4' or 2' x 28' or 28' x 2']

Help students complete the story problem, build models, and explain how to determine a rectangle that will meet the requirements.

Have each pair work together to create a new story problem that they can model with bricks. Have students write the story problem they have created in their journals.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 2x2 bricks from the box and count them. After the students have verified the number (20), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals. Students need colored pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the students and have them draw the correct color bricks.

Students should draw a specific color brick after the word "partner" based on the following:

Say:

>*I need to work on being a better partner. I did not listen to and help my partner as I should have.*
>*If this describes you today, draw an orange brick after the word "partner."*

>*I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.*
>*If this describes you today, draw a green brick after the word "partner."*

>*I was a very good partner today. I helped my partner by checking their work and not by doing their work. If this describes you today, draw a blue brick after the word "partner."*

Ask students to write "I can determine area" in their journals.
Students should draw a specific color brick after the words "I can determine the area" based on the following:
Say:

>*I need help determining the area. If this describes you today, draw an orange brick after the words "I can determine the area."*

>*I can determine the area. If this describes you today, draw a green brick after the words "I can determine the area."*

>*I can help others determine the area. If this describes you today, draw a blue brick after the words "I can determine the area."*

Day 3 – Real-World Problems for Area and Perimeter

Welcome

Welcome students to the third day of Brick Math Basic Measurement. Ask students if they can remember how to determine the area of a rectangle.

Have students determine the perimeter and area of the rectangle.

Ask students to give examples of when someone might want to use area or perimeter.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share with the class one good thing they did as a partner yesterday.

Have students find their partners and go to their desks/tables. Have students get their assigned brick set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions on pages 30-31, Problem #1, 1-2 in the Brick Math Advanced Measurement & Geometry Teacher Edition.
Students complete pages 28-29, Part 1, Problem #1, 1-2 in the Brick Math Advanced Measurement & Geometry Student Edition

Follow the instructions on pages 31-32, Problem #2, 1-3 in the Brick Math Advanced Measurement & Geometry Teacher Edition.
Students complete pages 30-31, Problem #2, 1-3 in the Brick Math Advanced Measurement & Geometry Student Edition

Move with Area and Perimeter

Have students choose a person to work with who is not their regular partner. <u>Each</u> team needs two dice.

Students choose who is Partner A and who is Partner B. Each partner rolls the dice to determine a length or width. Partner A doubles the number rolled to determine length, and Partner B adds 6 to the number rolled to determine the width. Partner A determines the unit of measure – feet, inches, centimeters, meters, etc.

Students write the length and width of the rectangle in their journals and determine the perimeter and the area and label the unit of measure.

Students change partners are repeat the activity 3 times.

Students find their partners and return to their desks/tables.

Part 2: Show What You Know

Read aloud the instructions for #1 on pages 32-33 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete #1 on pages 32-33, in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #2 on page 34 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 34, #2, in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #3 on page 34 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 35, #3, in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment

Remind students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 36 in the Brick Math Advanced Measurement & Geometry Student Edition. Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 36 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on pages 36-37 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Story Problems

Tell students a story problem like the following:

> Cecilia and Erin are shopping for a container to hold beads. They have 15 different types of beads that each need about a 1" x 2" compartment. Can you help Cecilia and Erin determine at least one container that would hold all the beads? What are the perimeter and area of your recommended container? [Answers will vary but may include 1" x 30" or 3" x 10" or 5" x 6"; It is also acceptable for a container to have a few additional compartments, but no fewer than 15.]

Help students complete the story problem, build a model, and explain the answer.

Have students work with their partners to solve the story problem and write the answer in their journals.

Have each pair work together to create a new story problem, build a model and explain the answer. Have students write the story problem they have created in their journals.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 2x3 bricks from the box and count them. After the students have verified the number (10), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment. Students need colored pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:
Say:

> *I need to work on being a better partner. I did not listen to and help my partner as I should have.*
> *If this describes you today, draw an orange brick after the word "partner."*

> *I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.*
> *If this describes you today, draw a green brick after the word "partner."*

> *I was a very good partner today. I helped my partner by checking their work and not by doing their work.*
> *If this describes you today, draw a blue brick after the word "partner."*

Ask students to write "I can correctly answer word problems using perimeter and area" in their journals.
Students should draw a specific color brick after the words "I can correctly answer word problems using perimeter and area" based on the following:
Say:

> *I need help correctly answering word problems using perimeter and* area*. If this describes you today, draw an orange brick after the words "I can correctly answer word problems using perimeter and area."*

I can correctly answer word problems using perimeter and area. If this describes you today, draw a green brick after the words "I can correctly answer word problems using perimeter and area."

I can help others correctly answer word problems using perimeter and area. If this describes you today, draw a blue brick after the words "I can correctly answer word problems using perimeter and area."

Day 4 – Relationships Between Area and Perimeter

Welcome

Welcome students to Day 4. Ask students if they can create a word problem that requires perimeter and/or area. Have students share several examples.

Have students look at the square you have drawn. Ask students to tell you the perimeter if the side measurement is 1 foot. [4 feet]
Ask students to tell you the area if the side measurement is 1 foot. [1 square foot]
Write this information on the chart paper or the board.

Then ask students to tell you the perimeter if the side measurement is 4 feet. [16 feet]
Ask students to tell you the area if the side measurement is 4 feet. [16 square feet]
Write this information on the chart paper or the board.

Finally, ask students to tell you the perimeter if the side measurement is 8 feet. [32 feet]
Ask students to tell you the area if the side measurement is 8 feet. [64 square feet]

Ask students to analyze the data for the area and perimeter of squares and draw some conclusions. [Answers will vary but may include that the perimeter is four times the measurement of a side, and the area is the side squared or multiplied by itself.]

Have students find their partners and go to their places at the desks or tables. Have students get the correct Brick Math set(s) and two baseplates for their team.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share something with their partners that they appreciate about working with that person.

Part 1: Show Them How

Follow the instructions for Part 1, #1 on page 36 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 38, Part 1, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #2, on pages 36-37 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 38-39, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #3, on pages 37-38 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 40, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #4, on page 38 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 40, #4, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #5, on page 38 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 41, #5, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #6, on page 38 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 42, #6, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #7, on page 39 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 42, #7, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #8, on page 39 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 42, #8, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #9, on page 39 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 43, #9, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #10, on page 39 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 43-44, #10, in the Brick Math Advanced Measurement & Geometry Student Edition.

Move with Area and Perimeter
Have 6 students come forward and create a rectangle of 2 x 3 by having four students in two groups of two side-by-side to represent sides equal to 2, and two students stand with arms out to the side to represent the two sides of 3. Ask the class what the perimeter and area of this configuration are. [2 + 2 + 3 + 3 = a perimeter of 10 students; 2 x 3 = an area of 6 square students.]

Have two students enlarge the rectangle as they wish – they must go to opposite sides and represent 1 student with arms down, 2 students with one arm out to the side, or 3 students with both arms out. Ask the class to determine the perimeter and area. Also, students who have represented 3 may wish to lower their arms and represent one or two students.

Have four students enlarge the rectangle as they wish – they must go to opposite sides and represent 1 student with arms down, 2 students with one arm out to the side, or 3 students with both arms out. Ask the class to determine the perimeter and area. Also, students who have represented 3 may wish to lower their arms and represent one or two students. You may wish to have other students represent 2 or 3 students.

Repeat this activity until all students are part of the rectangle. You may also move students from one set of sides to the other. (You may have to be part of the rectangle if you have an odd number of students in the class.)

Have students find their partners and go to their desks/tables.

Part 2: Show What You Know
Read aloud the instructions for #1, on page 40 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 44-45, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #2, on page 41 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 46, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

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Read aloud the instructions for #3, on page 42 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 46-47, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #4, on page 43 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 48, #4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment
Remind students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have for an answer.

Students complete Assessment #1 on page 48 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on pages 48-49 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on pages 50-51 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work. Walk around the room and check students' work.

Story Problem
Tell students a story problem like the following:
> Dave and Howie are working on laying bricks to mark the foundation for a shed. Each brick is 6" long. They want to make the shed an 8' x 10' rectangle. How many bricks will they need to complete the perimeter? [2 bricks per foot, two sides of 8 = 16 and two sides of 10 = 20, so a total of 36 feet x 2 bricks = 72 bricks]

Help students complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks and explain how they determined the answer. Have students write the story problem they have created in their journals.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x3 bricks from the box and count them. After the students have verified the number (20), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment. Students need colored pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:
Say:
> *I need to work on being a better partner. I did not listen to and help my partner as I should have.*
> *If this describes you today, draw an orange brick after the word "partner."*
>
> *I was a good partner today. I helped my partner but sometimes I did their work for them or I let them do my work.*
> *If this describes you today, draw a green brick after the word "partner."*
>
> *I was a very good partner today. I helped my partner by checking their work and not by doing their work.*

If this describes you today, draw a blue brick after the word "partner."

Ask students to write "I can apply my knowledge of area and perimeter" in their journals. Students should draw a specific color brick after the words "I can apply my knowledge of area and perimeter" based on the following:

Say:

I need help applying my knowledge of area and perimeter. If this describes you today, draw an orange brick after the words "I can apply my knowledge of area and perimeter."

I can apply my knowledge of area and perimeter. If this describes you today, draw a green brick after the words "I can apply my knowledge of area and perimeter."

I can help others apply their knowledge of area and perimeter. If this describes you today, draw a blue brick after the words "I can apply my knowledge of area and perimeter."

Day 5 – Surface Area

Welcome

Welcome students to Day 5. Ask students to use one hand to show their confidence level for working with area and perimeter on a scale of 1 – 5, with one being not very confident and 5 being very confident. [You are hoping for students to give you a 3 or above.]

Show students a box. Ask the students how many sides the box has. [6] Show students that it has a top and a bottom, and four sides – probably with two sets of sides that are the same. Tell students that each side has a surface area and that not all surfaces will have the same area. Ask students which sides will be the same. It may be helpful to have A, B, C, D, E, and F or top, bottom, side A, side B, side C and side D written on the sides of the box for clarity. [The top and the bottom should be the same, and presumably, sides A and C will be the same, and sides B and D will be the same.]

Have students find their partners and go to their places at the desks or tables.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students share which rule they think is the most important.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions for Part 1 on page 45 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 52, Part 1, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for Problem #1, 1-4 on pages 46-47 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 52-53, Problem #1, 1-4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for Problem #2, 1-3 on pages 47-48 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 53, Problem #2, 1-3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for Problem #3, 1-3 on pages 48-49 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 53-54, Problem #3, 1-3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Move with Surface Area Baseball

Have students form two teams for baseball. You will need 4 dice – two for the pitching team and two for the batting team. Both teams will need markers and chart paper located where the team can see, but hidden from the other team. Choose locations for the bases, home plate, and pitcher's mound. Choose which team will be at bat first. Have students on the 'field' team line up to pitch and the 'batting' team line up to hit. Pitchers and batters will change with each play.

The pitcher and the batter each roll two dice. The pitcher's roll becomes the length of the box, the batter's roll becomes the width, and then both the batter and the pitcher each roll one die. The combination becomes the height. Both the batter and the pitcher draw the box on chart paper and label the length, width, and height.

The second and third batters work together with the batter to solve the surface area for the top, right side, and front. The pitcher and 1st and 2nd basemen work together to solve the surface area for the top, right side, and front. When both teams are done, they compare answers. If both teams have all correct answers, the three batters take their base. (Tie goes to the runner.) If the batting team has one or more correct answers than the pitching team, extra bases are awarded for each additional correct answer. If the pitching team has one or more correct answers than the batting team, then outs are counted. The half-inning ends when either three outs are made or the batting team has run through its roster.
After each set of answers, the pitcher and the basemen move to the outfield. The catcher, third baseman, and shortstop move to pitcher and 1st and 2nd bases. The fielders move to 3rd base, shortstop, and catcher positions.
The fourth, fifth, and sixth names on the batting list become the batter and the second and third batters.

After 3 outs or everyone on the batting team working through the area problems, the teams switch positions. The batting team becomes the field team and the field team becomes the batting team. Repeat the activity until all batters have completed determining the area or three outs are made.

Continue the activity until all students have batted. Have students return the dice to you. Have students find their partners and go to their desks/tables.

Part 2: Show What You Know
Read aloud the instructions for #1, on page 49 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 54-55, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #2, on page 50 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 56, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.
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Read aloud the instructions for #3, on page 50 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 57, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #4, on page 51 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 58, #4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment
Remind students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have for an answer.

Students complete Assessment #1 on page 58 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 58 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on page 58 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work. Walk around the room and check students' work.

Story Problem

Tell students a story problem like the following:

> Tonica and Gerri were planning to mail two packages to a friend. The two packages measured 11"l x 8"w x 9"h and 11"l x 12"w x 9"h, respectively. [l= length, w= width, h= height] The two packages will be put into the same box. If the box needs to be one in larger than the packages put together, what size box will be needed? What will be the surface area of the top, right side, and front of the box?

Help students complete the story problem using the brick set and their journals.

Have each pair work together to create a new story problem that they can model with bricks and explain how they determined the answer. Have students write the story problem they have created in their journals.

As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of the Brick Math box.

Have the students remove all the 1x1 bricks from the box and count them. After the students have verified the numbers (100, or 25 of each color), they replace those bricks into the compartment and give you a thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment. Students need colored pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:

Say:

> *I need to work on being a better partner. I did not listen to and help my*
> *partner as I should have.*
> *If this describes you today, draw an orange brick after the word "partner."*
>
> *I was a good partner today. I helped my partner but sometimes I did their*
> *work for them or I let them do my work.*
> *If this describes you today, draw a green brick after the word "partner."*
>
> *I was a very good partner today. I helped my partner by checking their work*
> *and not by doing their work.*
> *If this describes you today, draw a blue brick after the word "partner."*

Ask students to write "I can determine surface area" in their journals.

Students should draw a specific color brick after the words "I can determine surface area" based on the following:

Say:

> *I need help determining the surface area. If this describes you today, draw*
> *an orange brick after the words "I can determine surface area."*
>
> *I can determine the surface area. If this describes you today, draw a green*
> *brick after the words "I can determine surface area."*
>
> *I can help others determine surface area. If this describes you today, draw a*
> *blue brick after the words "I can determine surface area."*

Day 6 – Volume

Preparation:

- **Read pages 52-53 in the Brick Math Advanced Measurement & Geometry Teacher Edition**
- **Students will need dice – one die per student**
- **Complete the Student Assessment Charts which are given to students/parents tomorrow**

Welcome

Welcome students to Day 6. Ask students if they remember the units used in perimeter [feet, inches, meters, etc.], area [square feet, square inches, square meters, etc.], surface area [square feet, square inches, square meters, etc.]

Tell students they have been working with the outside edge of a rectangle as the perimeter and the inside of a rectangle as the area. They also used the outside of a box and determined the surface area. Now, they are going to work with the volume, or the inside of the box to see how much could fit inside.

Have students find their partners and go to their places at the desks or tables.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students write in their journals one way the two partners work well together.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Metric Measures
Part 1: Show Them How

Follow the instructions for Part 1 on page 53 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 59, Part 1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 53-54 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #1, 1-8. Students complete pages 60-62, Problem #1, 1-8 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 54 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #2, 1-3. Students complete page 63, Problem #2, 1-3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 55-56 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #3, 1-2. Students complete page 64, Problem #3, 1-2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 57 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #4, 1-4. Students complete pages 64-65 Problem #4, 1-4 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 58 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete Problem #5. Students complete page 65, Problem #5 in the Brick Math Advanced Measurement & Geometry Student Edition.

Move with Measurement Baseball

Set up a baseball game like you did yesterday. Locate the bases, and divide students into two teams. Choose one team to be at bat first while the other team is in the field. Let the students choose the batting and pitching order. You will need 4 dice – two for the pitching team and two for the batting team. Both teams will need markers and chart paper located where the team can see, but hidden from the other team.
Have students on the 'field' team line up to pitch and the 'batting' team line up to hit. Pitchers and batters will change with each play.

The pitcher and the batter each roll two dice. The pitcher's roll becomes the length of the box, the batter's roll becomes the width, and then both the batter and the pitcher each roll one die. The combination becomes the height. Both the batter and the pitcher draw the box on chart paper and label the length, width, and height.

Today, the batter and the pitcher meet head-to-head. The batter and the pitcher determine the volume. When both players are done, they compare answers. If both players have correct answers, the batter takes the base. (Tie goes to the runner.) If the batter answers correctly and the pitcher answers incorrectly, the batter moves to 2nd base. If the pitcher answers correctly and the batter answers incorrectly, it is an out. The half-inning ends when either three outs are made or the batting team has run through its roster.

Switch positions after each play. A new batter comes to the plate. The pitcher becomes the catcher and the catcher moves to right field. Everyone on the fielding team moves position right to center field, left field to third base, etc.

At the end of each half-inning, the batting team becomes the field team and the field team becomes the batting team. Repeat the activity until all batters have played or three outs are made for each half-inning.

Have students return to their desks/tables with their partners.

Part 2: Show What You Know

Follow the instructions on page 59 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete #1. Students complete page 66, #1 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on page 60 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete #2. Students complete page 67, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions on pages 60-61 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Complete #3. Students complete page 68, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment

Students complete Assessment #1 on page 69 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 69 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Students complete Assessment #3 on page 70 in the Brick Math Advanced Measurement & Geometry Student Edition.
Ask partners to check the work but explain that they should not touch the brick model or write anything on another person's paper. They should only discuss this with their partners. Walk around the room and check students' work.

Story Problem

Tell students a story problem like the following:

> Samantha needs to know how many boxes of crackers will fit on a shelf
> that is 30" long, 24" wide, and 12' high. A box of crackers is 10" high, 4"
> wide, and 6" long. How many boxes will fit on the shelf? [5 boxes will fit in
> length, 6 boxes in width, and 1 box in height. 5 x 6 x 1 = 30 boxes]

Help students to complete the story problem.

Have each pair work together to create a new story problem that they can model with bricks
that shows equivalent fractions.
As time allows, have students share their stories and models with at least one other team.

Inventory Check

Have students place all the bricks they have used today back into the correct compartments of
the Brick Math box.

Have the students remove all the 1x6 bricks from the box and count them. After the students
have verified the number (10), they replace those bricks into the compartment and give you a
thumbs-up. The brick set is ready for collection and storage.

Self-Assessment

Ask students to use their journals to complete the self-assessment. Students need colored
pencils or crayons to complete.

Ask students to write the word "partner" in their journals. Read aloud the statements to the
students and have them draw the correct color brick.

Students should draw a specific color brick after the word "partner" based on the following:
Say:

> *I need to work on being a better partner. I did not listen to and help my
> partner as I should have.*
> *If this describes you today, draw an orange brick after the word "partner."*
>
> *I was a good partner today. I helped my partner but sometimes I did their
> work for them or I let them do my work.*

If this describes you today, draw a green brick after the word "partner."

I was a very good partner today. I helped my partner by checking their work and not by doing their work.
If this describes you today, draw a blue brick after the word "partner."

Ask students to write "I can determine volume" in their journals.
Students should draw a specific color brick after the words "I can determine volume" based on the following:
Say:

I need help determining volume. If this describes you today, draw an orange brick after the words "I can determine volume."

I can determine volume. If this describes you today, draw a green brick after the words "I can determine volume."

I can help others determine volume. If this describes you today, draw a blue brick after the words "I can determine volume."

Day 7 – Relationships Between Surface Area and Volume

Preparation:

- **Read pages 62-63 in the Brick Math Advanced Measurement & Geometry Teacher Edition.**
- **Complete the Student Assessment Charts which are given to students/parents at the end of the day**
- **Students will need dice – one die per student**

Welcome

Welcome students to the final day of the program. Ask students how to compute the volume of a rectangular cube. [length x width x height]

Tell them they are going to work with the relationship between volume and surface area today.

Working with a Partner

Remind students of the partner rules created on Day 1. Have students write a thank-you note to their partner. They will give the thank-you notes to their partners at the end of the day.

Have students get the correct Brick Math set(s) and two baseplates for their team.

Part 1: Show Them How

Follow the instructions for #1 on pages 63-64 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 71, #1, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #2, on page 64 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 71, #2, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #3, on page 64 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 72, #3, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #4, on page 65 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 72, #4, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #5, on page 65 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 72, #5, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #6, on page 65 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 72, #6, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #7, on page 66 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 72, #7, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #8, on page 66 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 73, #8, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #9, on page 67 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 73, #9, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #10, on page 67 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 73, #10, in the Brick Math Advanced Measurement & Geometry Student Edition.

Follow the instructions for #11, on pages 67-69 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 74-75, #11, in the Brick Math Advanced Measurement & Geometry Student Edition.

Move with Surface Area and Volume
Ask students to form groups of 3 and give each group 4 dice. Have each group determine which student determines the length, which student determines the width, and which student determines the height. Each student rolls a die twice. The sum of the two rolls is the number used for length, width, or height. Students determine the measure – inches, feet, yards, centimeters, meters, and so forth. All students write in their journals the equation to determine the volume and the solution. Students must label their answers and should ensure they are

using cubed measurements. Next, students determine the surface area of the bottom, left side, and back. Students should have access to the brick sets.

When all groups have agreed on the solution, students create new groups. No group can contain two people who worked together previously. Repeat the activity twice.

Part 2: Show What You Know
Read aloud the instructions for #1 on page 70 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 76, #1, a-f in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #2 on page 71 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 77, #2 in the Brick Math Advanced Measurement & Geometry Student Edition.

Read aloud the instructions for #3 on page 72 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete page 78, #3 in the Brick Math Advanced Measurement & Geometry Student Edition.

Challenge
Read aloud the instructions for Challenge Problem on pages 72-73 in the Brick Math Advanced Measurement & Geometry Teacher Edition. Students complete pages 79-81, Challenge Problem in the Brick Math Advanced Measurement & Geometry Student Edition.

Content Assessment
Remind students that they will complete the Content Assessment on their own. However, they will ask their partners to check the work *after* they have completed the assessment. Partners check the work but they should not change their partner's models nor write anything on another person's paper. Partners discuss the differences they might have on an answer.

Students complete Assessment #1 on page 81 in the Brick Math Advanced Measurement & Geometry Student Edition.
Discuss the answers with the class. Help students to improve their answers as needed.

Students complete Assessment #2 on page 81 in the Brick Math Advanced Measurement & Geometry Student Edition. Walk around the room and check students' work.

Students complete Assessment #3 on page 82 in the Brick Math Advanced Measurement & Geometry Student Edition.
Walk around the room and check students' work.

Students complete Assessment #4 on page 83 in the Brick Math Advanced Measurement & Geometry Student Edition. Walk around the room and check students' work.

Story Problem

Tell students a story problem like the following:

> Tonica and Gerri are excited to share some chocolate chip cookies with
> their Grandparents. They have 3 boxes to choose from and want to send
> her as many as possible. Which box should they use?
>> Box 1: 6" long, 6" wide, 3" tall
>> Box 2: 12" long, 3" wide, 4" tall
>> Box 3: 10" long, 4" wide, 6" tall

Have students write the equations in their journals to prove their answers after building models.

Have each pair work together to create a new story problem that they can model with bricks. Have students write the story problem they have created in their journals.

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As time allows, have students share their stories and models with at least one other team.

Optional Parent Activity and Materials Check-In

Allow parents to come to the classroom for the last 20 minutes of the day.
Each parent will work with their child. The child will be the teacher for these activities and will help their parents learn how to use the bricks.

If a parent is unable to attend, the student can do the activity on their own or with a partner.

Ask students to show their parents how to build a model to show a rectangle with a perimeter of 16 units.
Have students ask their parents to build a model to show a rectangle with a perimeter of 24 units.
Have students ask their parents to build a model to show a rectangle with a perimeter of 16.

Ask students to show their parents how to use the model to determine the area.

Have students ask their parents to build a model with a length of 10 and a width of 5. Have parents determine the area.

Have a cheer for the parents and students!

Inventory Check

Place all the bricks back in the correct compartments in the box.

Ask the students and parents to spot-check the compartments and make sure all the bricks are in the correct locations. Have students look on the floor to find any stray bricks.

Have each team bring their materials to you in numerical order so you can keep track of your sets. You should have your sets in order and organized for the next use.

Have each student give their partner the thank-you note that they wrote this morning.

Give each child or parent the completed Student Assessment Chart, noting growth in Basic Measurement.

Tell everyone thanks for coming!