2-D and 3-D Shapes

Starfall
Kindergarten
MATHEMATICS

2-D and 3-D Shapes

Unit 6 • Overview

Week 13

Week 14

Week 15

Frequently Asked Questions

Why does the Starfall Math curriculum spend so much time teaching shapes?

Most children have many ideas about shapes upon entering kindergarten. However, teachers often do not question children appropriately in order to extend their ideas. Many times the questions teachers ask are close-ended and require simple recall to answer correctly.

Research shows that young children's concepts about shapes stabilize by six years of age, but that these concepts are not necessarily accurate. Starfall Kindergarten Math builds on children's prior knowledge and generates new content. The children learn and practice awareness of shape properties, identify individual shapes in a variety of positions, and experiment with combining smaller shapes to create larger ones. Children are asked to complete statements such as "I know this is a (name of shape), because (shape's properties)." Doing so provides them the opportunity to identify shapes using their attributes or properties. Learning the accurate properties of two-dimensional shapes lays the foundation for future understanding of three-dimensional shapes.

Starfall Kindergarten Math introduces math nets. Isn't working with math nets a 5th-grade skill?

A math net is simply a two-dimensional paper shape that can be folded to create a three-dimensional shape. When a math net is laid flat, it shows the pattern of a three-dimensional shape, including each of its faces. By introducing math nets in kindergarten, the children see more concretely the relationship between two-dimensional and three-dimensional shapes.

Spatial thinking plays a fundamental role in our lives, ranging from the everyday activities we take for granted (e.g., navigating a new city, assembling furniture, remembering the location of objects, etc.) to the more specialized skills required for higher education and various professions (e.g., architecture, dentistry, medicine, art and design). Recent research shows that spatial thinking is strongly related to entrance and success in science, technology, engineering, and math (STEM) disciplines.

Learning two-dimensional shapes is key for further math learning. If children don't recognize two-dimensional shapes, they most likely will not be able to recognize three-dimensional shapes. Using math nets is a way to help the children see the relationship between them.

Unit 6 Research

Shape is a fundamental idea in mathematics and in early childhood development. Beyond mathematics, shape is the basic way children learn the names of objects, and attending to the objects' shapes facilitates that learning.[1] Through the study of geometric shapes, children can begin to develop ways to mentally structure the spaces and objects around them and develop mathematical reasoning ability. Every 2-D shape or 3-D object has multiple aspects: the overall shape, the particular parts and features of the object or shape, and the relationships among these parts and the whole object or shape. Young children need time to observe and analyze the parts and features of geometric shapes, the "inside region" and the "outer boundary," the number and length of sides, and the nature of these sides and their relationships to each other. The study of geometric shapes is not only about seeing shapes as wholes, it's about finding and analyzing their properties and features.[2]

Children first identify shapes at the visual level on the basis of their appearance, then represent shapes at the "descriptive" level on the basis of their properties. They tend to regard squares as a distinct category and not as a special kind of rectangle with four sides that are equal in length. Children should learn that a square is a special type of rectangle (a square-rectangle). This approach has been shown to be successful with kindergartners.[3]

Children need to experience various examples of shapes and understand their attributes. Examples of triangles and rectangles should include a wide variety of shapes, including "long," "skinny," and "fat" examples.[4] As children move beyond perceiving and naming shapes, they build mathematical concepts as they discuss the parts and attributes of shapes. Well-designed activities using hands-on manipulatives can effectively build geometric and special skills and general reasoning abilities. Extensive mathematics research conducted by Douglas H. Clements, a leading teacher, researcher, and writer in early childhood mathematics at the State University of New York at Buffalo, has shown that the use of manipulatives helps young children develop geometric and spatial thinking. Manipulatives, either physical or using a computer, assist children in constructing mathematical meaning. Computers can be used to carry out mathematical processes that are difficult or impossible to perform with physical manipulatives.[5] In a Starfall Math classroom, children build squares and other polygons with toothpicks and marshmallows; they form shapes with play dough or with their bodies, either singly or with their classmates. They gather rectangles and describe in their own words why their shapes are rectangles. Children are shown a variety of shapes and have to decide whether they are or are not rectangles and why. Children work online at Starfall.com on the Geometry and Measurement section of the Math Index.

In summary, key findings from broad research in mathematics in early childhood education tells us that children are better prepared for all school tasks when they gain the thinking tools and representational competence of geometric and spatial sense.[6]

(1) Jones, SS., and Smith, L.B. (2002). How children know the relevant properties for generalizing object names. *Developmental Science,* 2, 210-232.

(2) Committee on Early Childhood Mathematics, (2009). *Mathematics Learning in Early Childhood: Paths toward Excellence and Equity.* Cross, C.T., Woods, T. A., and Schweingruber, H. (Eds). Washington, D.C.: National Academies Press.

(3) Clements, D.H., and Sarama, J. (2007). Early childhood mathematics learning. In F.K. Lester, Jr. (ed.), *Second Handbook of Research on Mathematics Teaching and Learning* (pp. 461-555). New York: Information Age.

(4) Seo, K.H., and Ginsburg, H.P. (2004). What is developmentally appropriate in early childhood mathematics education? In Clements, D.H., Sarama, J., and DiBaise, A.M. (Eds.), *Engaging Young Children in Mathematics: Standards for Early Childhood Mathematics Education* (pp. 91-104). Mahwah, NJ: Erlbaum.

(5) Clements, D. H. (1999). Concrete manipulatives, concrete ideas. *Contemporary Issues in Early Childhood*, 1 (2, 45-60).

(6) Ginsburg, H.P., Greenes, C., and Balfanz, R. (2003). *Big Math for Little Kids.* Parsippany, NJ: Dale Seymour.

Unit 6 Summary

Time Frame: 15 days

In Unit 6 the children are introduced to three-dimensional shapes and their properties, and through the use of "math nets" they discover the two-dimensional shapes that comprise each three-dimensional shape. The children will learn to identify three-dimensional shapes (*cone, cube, cylinder, sphere, pyramid, rectangular prism*) in the environment.

Essential Questions

(K.G.A.1) How are shapes important and how are they used in our environment?

(K.G.A.3) How can we tell if a shape is two-dimensional or three-dimensional?

(K.G.B.5) How can building shapes help us to better understand the characteristics of a shape?

Enduring Understandings

Shapes can either be two-dimensional or three-dimensional.

Two-dimensional and three-dimensional shapes are identified by their properties.

Three-dimensional shapes can be created using two-dimensional shapes ("math nets").

Three-dimensional shapes are found in the environment.

Vocabulary

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

Cone	Math Net	Rectangular prism	Sphere
Cube	Museum	Roll	Stack
Cylinder	Properties	Slide	Three-Dimensional
Edge	Pyramid	Solid Shapes	Vertex (Vertices)
Faces			

Recommended Literature

Cubes, Cones, Cylinders, & Spheres by Tana Hoban

I Spy Shapes in Art by Lucy Micklethwait

Icky Bug Shapes by Jerry Pallotta

Shape Up! by David A. Adler

Three Pigs, One Wolf, Seven Magic Shapes by Grace Maccarone

Three Sides and the Round One by Margaret Friskey

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.1	Identify numerals out of sequence.
CC.2	Supply missing number in a sequence.
CC.4	Count to 100 by twos and by fives.

Operations & Algebraic Thinking

OA.1	Identify, describe, or extend simple patterns.

Measurement & Data

MD.1	Identify and use time measurement tools.
MD.2	Use and interpret graphs.

Estimation

E.1	Understand the meaning of estimation.
E.2	Make predictions to determine reasonable answers.

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.*

Operations & Algebraic Thinking

		Inline Summary Form
A.2	Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.	*Solve word problems with addition and subtraction within 10.*

Number & Operations in Base Ten

		Inline Summary Form
A.1	Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	*Understand numbers 11-19 are ten ones plus more ones.*

Common Core Standards (Continued)

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.*

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.*
A.2	Correctly name shapes regardless of their orientations or overall size.	*Correctly name shapes.*
A.3	Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	*Identify shapes as two- or three-dimensional.*
B.4	Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).	*Analyze and compare two- and three-dimensional shapes.*
B.5	Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.	*Build and/or draw shapes.*
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.*

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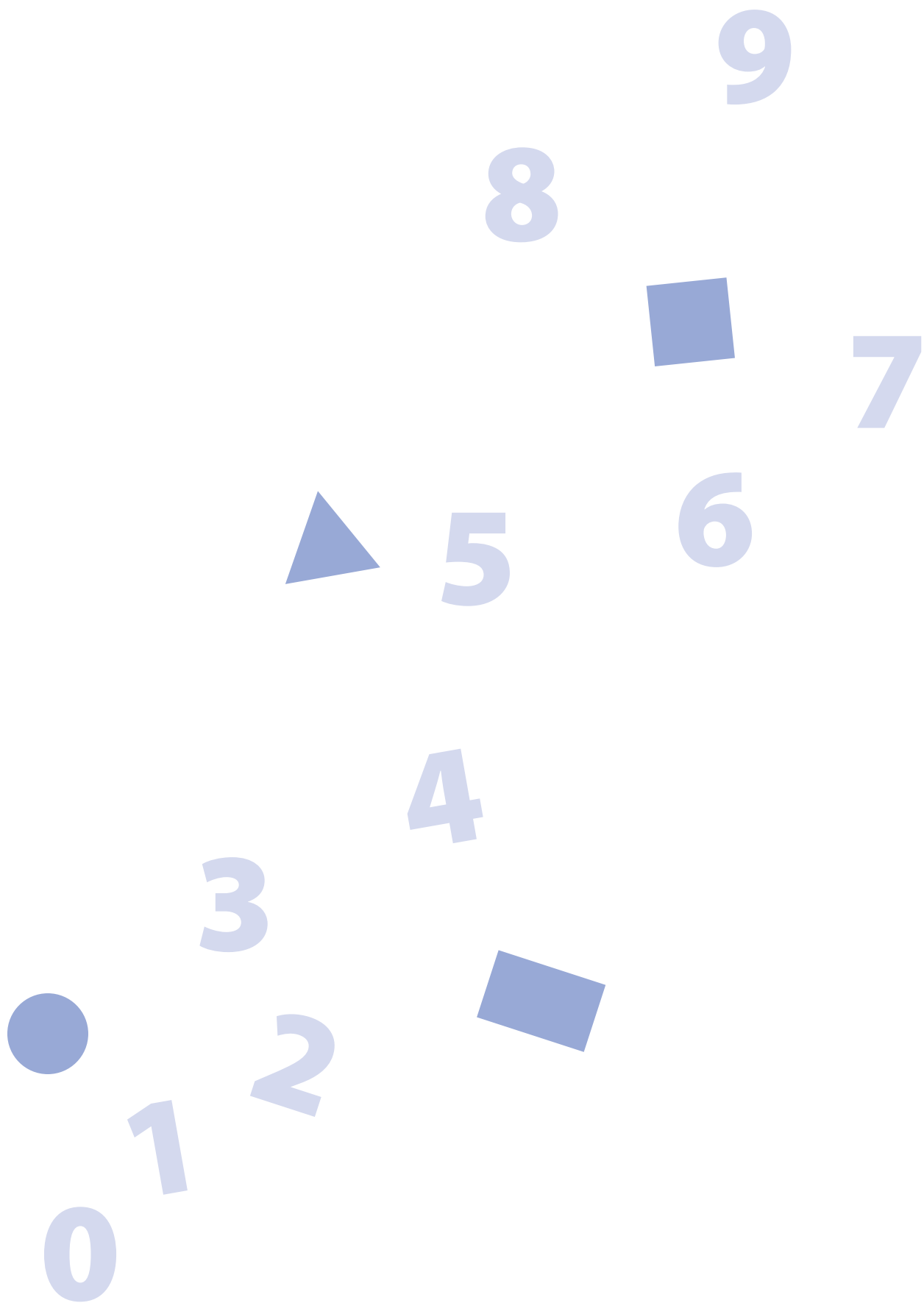
Week **13** Summary

This week the children will review two-dimensional shapes (*circle, square, triangle and rectangle*) and learn the properties of several three-dimensional shapes. Through the use of the "math net" the children also discover the two-dimensional shapes that comprise each three-dimensional shape. The children will also:

- Compare two- and three-dimensional shapes
- Identify three-dimensional shapes (*cone, cube, rectangular prism*)
- Identify the number that comes before and after

Preparation

Unit 6 requires the use of several sets of wooden or plastic three-dimensional shapes (cone, cube, cylinder, sphere, square pyramid, rectangular prism).

Prepare copies of the sample Museum Letter to parents (or create your own) to send home with the children on the first day of this unit. The letter should request that parents help their children locate and collect objects from home shaped like cones, cubes, cylinders, spheres, pyramids, and rectangular prisms to bring to school for an activity that will take place on **Day 4** of **Week 14**. Collect the objects as the children bring them. Backpack Bear may add to the collection in case children forget to bring objects to school.

Museum Letter Blackline

You will use the math net diagrams for 3-D shapes in this unit.

DAY ❶

You will use 2-D Shape Cards: *circle, rectangle, square,* and *triangle.*

Prepare a construction paper circle, triangle, square, and rectangle and draw a face on each of them.

Have enough non-menthol shaving cream available for each child to draw shapes on their tables. You will also need wet wipes or paper towels for cleanup.
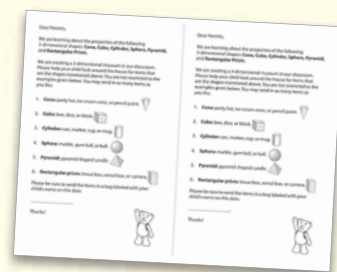
DAY ❷

You will use 2-D Shape Cards: *circle, rectangle, square,* and *triangle.*

You will also use wooden or plastic 3-D shapes and 3-D Shape Cards: *cone, cube, cylinder, pyramid, rectangular prism, and sphere.*

You will need one cube per child and a container of connect cubes for each table of children.

Cut out one *cube* math net diagram.

Note: Focus the children's attention on the shapes, which are defined by dark outlines

on the math net diagrams. Tabs, defined by faint lines, are included to give the math net diagrams form, and hold them together when they are folded.

DAY ❸

Cut out one *rectangular prism* math net diagram in preparation for today's lesson.

You will need one die for each child.

You will use wooden or plastic 3-D shapes and 2-D Shape Cards *circle, rectangle, square,* and *triangle*.

DAY ❹

You will use Shape Cards: *cube, cone, cylinder, rectangular prism, square pyramid,* and *sphere*.

Cut out one *cone* math net diagram in preparation for today's lesson.

DAY ❺

*Activity Center 1* — Navigate a classroom computer to *Starfall.com*.

Activity Center 2 — The children will use math mats, play dough, and 3-D Shape Cards: *cube, rectangular prism,* and *cone* to create a "Shape Town."

Activity Center 3 — The children will need a "Shape Town" game board, playing pieces, and a 2-D shape game spinner.

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

Activity Center 5 — The children will need a "Race to 20" game board, 1-5 game spinner, and playing pieces. The children in this center play "Race to 20." While they are playing, individually assess the children's ability to skip count by tens.

Prepare a copy of the Summative Assessment Checklist for Unit 6, Week 13.
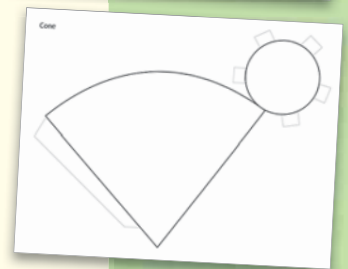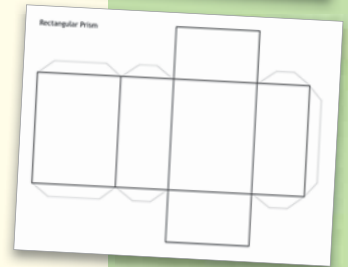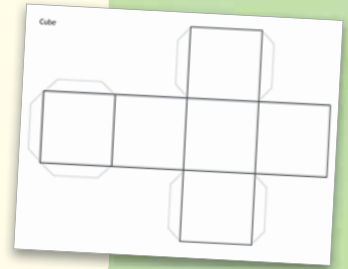
Math Net Diagrams
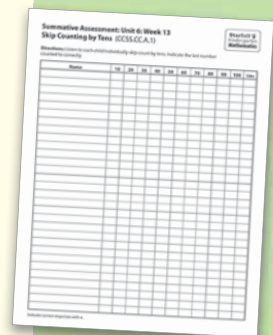
Summative Assessment
Unit 6 - Week 13

	DAY ①	DAY ②
Daily Routines	• Calendar　　• Place Value • Weather　　• Hundreds Chart • Number Line	
Magic Math Moment	Number sense	Taller or shorter?
Math Concepts	Making sense of number order – before/after 2-D Shape Properties (triangle, rectangle, square, circle)	Compare object heights ***Introduce*** 　3-D Shapes: *Cube* 　Math nets – using 2-D shapes to create 3-D shapes
Formative / Summative Assessment	Distinguish 2-D shapes by their properties	Properties of a cube
Workbooks & Media	*Starfall.com,* Geometry & Measurement: "Triangle" *Backpack Bear's Math Big Book* "Shape Rhyme" page 9	*Starfall.com,* Geometry & Measurement: "2-D/3-D Shapes"

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

DAY 3	DAY 4	Learning Centers
Introduce dice	Count by fives and tens	**1** *Starfall.com:* • Monthly Calendar • Geometry and Measurement: "2-D/3-D Sort," "2-D/3-D Shapes," "3-D Space"
Count rolls of dice Review the cube and its properties ***Introduce*** 3-D Shapes: *Rectangular Prism* Rectangular prism math net	Skip counting Review the cube and rectangular prism and their properties ***Introduce*** 3-D Shapes: *Cone* Cone math net	**2** Create a Shape Town with play dough
Using cubes to create a rectangular prism	Real objects shaped like cones	**3** "Shape Town" Game
		4 Teacher's Choice
	Backpack Bear's Math Big Book "Shape Rhyme" page 9	**5** "Race to 20" Summative Assessment - Skip Counting by tens

Daily ⊙ Routines

CALENDAR 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.

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.

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?**

Magic Math Moment

Number Sense

Place the Number Cards face down in a pocket chart. A volunteer reveals a Number Card and identifies the number.

Ask: **What number comes before (**number on the card**)?**

Remove the Number Card from the pocket chart. The volunteer chooses a classmate to reveal another number. Ask questions such as:

- **What number comes after (**number on the card**)?**
- **What is (**number on the card**) plus 2 more?**

Shape Properties

Materials
☐ 2-D Shape Cards: *circle, rectangle, square,* and *triangle*
☐ Prepared triangles, squares, and rectangles
☐ Shaving cream (non-menthol)
☐ Computer navigated to Starfall.com, Geometry & Measurement: "Triangle"

1 ## Review Properties of a Triangle

Say: **Let's review the properties of a triangle.** *Properties***, that's a good vocabulary word! Say,** *properties***.** (Children repeat, *properties*.) **A** *property* **is something we can see that helps us identify objects.**

Indicate the *triangle* Shape Card. Ask: **What makes this shape a triangle?**

Explain: **The properties of a triangle are that it has three straight lines and three angles. Another property of a triangle is that it is flat and has one face.**

Indicate the triangle with the face drawn on it. Say: **A face is a flat surface that has edges like this one.** Indicate the edges of the triangle.

Gather the children around a classroom computer navigated to *Starfall.com*, Geometry and Measurement: "Triangles."

Individually indicate each different type of triangle. Ask: **Is this a triangle? Why? What are the properties of a triangle?**

Explain: **Right, a triangle has three straight lines, three angles, and one flat face. Even though the straight lines and angles are different in each of these triangles, all of the shapes have the properties of a triangle, so they are all triangles.**

Counting & Cardinality

CC.1 - Identify numerals out of sequence.

CC.2 - Supply missing number in a sequence.

Geometry

A.2 - Correctly name shapes.

B.4 - Analyze and compare two- and three-dimensional shapes.

B.6 Compose simple shapes to form larger shapes.

2 Review the Properties of a Rectangle

Indicate the *rectangle* Shape Card. Ask:

- **What is the name of this shape?**
- **What properties make this shape a rectangle?**

Explain: **The properties of a rectangle are that it has four straight lines and four right angles. Another property of a rectangle is that it is flat and has one flat face!** Indicate the rectangle with the face drawn on it.

3 Review the Properties of a Square

Indicate the *square* Shape Card. Ask:

- **What is the name of this shape?** (Volunteers respond.) **Right, it is a square. Let's check the properties of this square.**
- **Does it have four straight lines?**
- **Does it have four right angles?**
- **What is the difference between this rectangle** (Indicate a rectangle.) **and this square?** (Indicate a square.)

Explain: **If a shape has four straight lines and four right angles, it is a rectangle! A square is a special kind of rectangle. A rectangle has two longer straight lines and two shorter straight lines, and a square has four lines that are all the same length.**

Ask: **What is the same about a rectangle and a square?** (Volunteers respond.) **Right, they both have four lines and four angles!**

Ask: **What is the same about all these shapes?** (Volunteers respond.) **Right, these shapes are all flat and they all have one flat face.**

4 Review the Properties of a Circle

Indicate the *circle* Shape Card. Ask:

- **What is the name of this shape?**
- **What makes this shape a circle?**

Explain: **The properties of a circle are that it has a curved line that is the same distance from the center all the way around, and it has no straight lines. Another property of a circle is that it is flat and has one flat face!** Indicate the circle with the face drawn on it.

Say: **Tomorrow we will learn about shapes that are used to build buildings. Can you build a building with a flat shape? Why or why not?**

Formative Assessment

Draw Shapes with Shaving Cream

Distribute a small amount of shaving cream to each child. The children spread the shaving cream in preparation for drawing a shape.

Say: **I will say the properties of a shape. You draw the shape in your shaving cream. Ready?**

Name the properties of each shape (*circle, square, triangle,* and *rectangle*) incorporating the term "flat face." Check after naming each shape to be sure the children have drawn it correctly.

Remember that Formative Assessments are included to help teachers assess the children's understanding. Use the results to help drive your instruction, meeting with small groups of children needing extra exposure to specific skills before moving forward. Likewise, move a little more quickly through skills the children have mastered.

Magic Math Moment

Taller or Shorter

Say: **Let's play "Taller or Shorter."**

Choose a volunteer to come to the front of the classroom. Ask: **Is (**child's name**) taller or shorter than this table?** (Volunteers respond.) **Yes (**child's name**) is taller than the table, and the table is shorter than (**child's name**).**

The volunteer chooses another volunteer. Ask: **Is (**child's name**) taller than the door?** (Volunteers respond.) **No, (**child's name**) is shorter than the door, and the door is taller than (**child's name**).**

Continue the game as time permits. Volunteers may ask the questions and compare heights of their classmates to classroom objects.

Measurement & Data

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

Geometry

B.4 - Analyze and compare two- and three-dimensional shapes.

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

Introduce the Cube

Essential Question: *How can we tell if a shape is two-dimensional or three-dimensional?*

Materials

☐ 2-D Shape Cards: *circle, rectangle, square, triangle*

☐ 3-D Shape Cards: *cone, cube, cylinder, pyramid, rectangular prism, sphere*

☐ 3-D wooden or plastic shapes

☐ One cube per child

☐ One cube math net diagram

☐ One container of connect cubes for each table of children

☐ *Backpack Bear's Math Big Book*, pages 9 and 10

1 Review Two-Dimensional Shapes

Display the *circle, rectangle, square,* and *triangle* Shape Cards.

Say: **We have learned about two-dimensional, flat shapes like circles, rectangles, squares, and triangles.**

Indicate the Two-Dimensional Shape Cards. Say: **These shapes have heights** (Indicate the height.) **and lengths** (Indicate the length.) **Height and length are two dimensions, so these shapes are two-dimensional.**

2 Introduce Three-Dimensional Shapes

Display *Backpack Bear's Math Big Book,* page 9.

Indicate the 3-D Shapes Rhyme. Say: **Today we will learn about shapes that are three-dimensional.** Read the 3-D Shapes Rhyme.

Gather the children around a classroom computer and navigate to *Starfall.com*, Geometry & Measurement: "2-D/3-D Shapes."

After viewing, briefly discuss that there were both two- and three-dimensional shapes.

Ask: **How could you tell the difference between the two-dimensional and three-dimensional shapes? Right, two-dimensional shapes are flat. Three-dimensional shapes are not flat!**

Display the *cone, cube, cylinder, pyramid, rectangular prism,* and *sphere* 3-D Shape Cards and wooden shapes. Say: **Look at these shapes. Are they flat? What do you notice about them?**

Explain: **These are solid shapes. We call them three-dimensional shapes. Say, *three-dimensional shapes.*** (Children repeat, *three-dimensional shapes*.) **These shapes have height** (indicate)**, length** (indicate)**, and depth** (indicate)**. They have three dimensions, so they are called three-dimensional shapes.**

3 Introduce the Cube

Indicate the cube. Say: **Look at this shape. Which two-dimensional shape does it look most like? Why?**

Explain: **We call this three-dimensional shape a *cube*. Say, *cube*.** (Children repeat, *cube*.) Continue:

- **Let's count how many faces a cube has.** Indicate and count the six faces.
- **A cube has corners, or *vertices*. Say, *vertices*.** (Children repeat, *vertices*.) **Let's count how many vertices it has.** Indicate and count the eight vertices.
- **Now let's count the flat edges. A flat edge is where two faces meet.** Indicate and count the twelve flat edges.
- **A cube has six faces, eight vertices, and twelve flat edges.**

Distribute a cube to each child. Say: **Here is a smaller cube. Examine, or look closely, at your cube to see what properties it has.**

Ask: **How many faces does your cube have?** Pause as children count the faces on their cubes. Repeat for the vertices and edges.

Ask: **Which two-dimensional shape was used to make this cube? Right, a square.**

4 Introduce the Math Net

Indicate the cube math net diagram. Say: **This is a math net diagram. A math net diagram is a pattern of two-dimensional shapes. When the two-dimensional shapes are folded together they make a three-dimensional shape. What two-dimensional shape do you see in the math net diagram? Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.
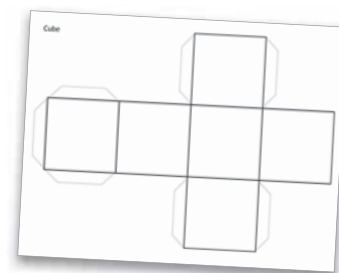
■■▶ **Formative Assessment**
◀■■

Properties of a Cube

Display *Backpack Bear's Math Big Book*, page 10.

Indicate the cube. Say: **Here is a page that shows the properties of a cube.** Ask:

- **Who can point to a face on the cube?**
- **Who can point to a vertex?**
- **How about a flat edge?**

Briefly discuss the properties outlined on the page. Continue: **Point to a vertex on your cube.** (The children do this.) **Say, *vertex.*** (Children repeat, *vertex.*)
Repeat for the faces and edges of the cubes.

Magic Math Moment
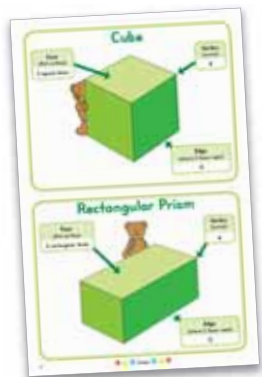
Introduce Dice

Materials
☐ 1 die per child

Distribute one die to each child, and instruct the children to examine them.

Ask: **Who can tell us the name of the shape of the dice? Right, the dice are cubes! How do you know?** Discuss the properties of cubes and dice.

Continue: **What do you see on your dice?** Volunteers respond.

Say: **Roll your die and count the number of dots.** The children do this.

Continue: **Stand if you rolled a three. Let's count how many children rolled a three.**

The class counts the children who stand. Say: **Great! Now roll the die again and stand if you roll a five.**

Continue as time permits. After the activity, the children put their dice in their math bags.

Counting & Cardinality

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

Measurement & Data

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

Geometry

B.4 - Analyze and compare two- and three-dimensional shapes.

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

Introduce the Rectangular Prism

Essential Question: *How can building shapes help us to better understand the characteristics of a shape?*

Materials

☐ *Backpack Bear's Math Big Book,* page 10

☐ Wooden or plastic cube and rectangular prism

☐ 2-D Shape Cards: *circle, rectangle, square, triangle*

☐ One rectangular prism math net diagram

☐ Math bags

① Review the Properties of a Cube

Display *Backpack Bear's Math Big Book*, page 10.

Say: **Let's review how many faces a cube has.** Indicate and count the six faces.

- **A cube has corners, or vertices. Say, *vertices*.** (Children repeat, *vertices*.) **Let's count how many vertices it has.** Indicate and count the eight vertices.

- **Now let's count the flat edges. A flat edge is where two faces meet.** Indicate and count the twelve flat edges.

- **A cube has six faces, eight vertices, and twelve flat edges.**

Note: While it is important for the children to remember the meaning of faces, vertices and edges, they are not expected to remember how many of each are found in each three-dimensional shape.
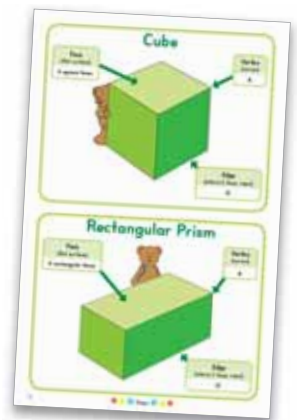
2 Introduce the Rectangular Prism

Display the *triangle, circle, square,* and *rectangle* Shape Cards.

Indicate the rectangular prism. Say: **Look at this shape. Which of the two-dimensional shapes does this shape look most like? Why?**

Explain: **We call this three-dimensional shape a *rectangular prism*. Say, *rectangular prism.*** (Children repeat, *rectangular prism*.)

- **Let's count how many faces a rectangular prism has.** Indicate and count the six faces.
- **A rectangular prism has corners, or vertices. Let's count how many vertices it has.** Indicate and count the eight vertices.
- **Now let's count the flat edges. A flat edge is where two faces meet.** Indicate and count the twelve flat edges.
- **A rectangular prism has six faces, eight vertices, and twelve flat edges.**

> Use real three-dimensional objects along with the Shape Cards to give the children tactile experience with these shapes.

3 Introduce the Rectangular Prism Math Net

Indicate the rectangular prism math net diagram. Say: **Look at this rectangular prism math net diagram. What two-dimensional shapes do you see?**

Continue: **Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.

Display *Backpack Bear's Math Big Book*, page 10.

Indicate the rectangular prism. Say: **Here is a picture that shows the properties of a rectangular prism.** Ask:

- **Who can point to a face on the rectangular prism?**
- **Who can point to a vertex?**
- **Who can point to an edge?**
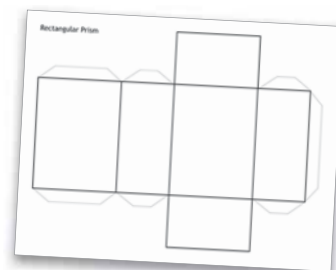
Briefly discuss the properties outlined on page 8. Continue: **Point to a *vertex* on your rectangular prism.** (The children do this.) **Say, *vertex*.** (Children repeat, *vertex*.) Repeat for the faces and edges of the cube.

Say: **Remember we said you couldn't build things with two-dimensional flat shapes. Raise your hand if you know why not.** (Volunteers respond.) **Can you build something with three-dimensional shapes? Why?**

Formative Assessment

Cubes and Rectangular Prisms

Distribute math bags. Say: **Remove one connect cube. What shape is it? Right, a cube!**

Ask: **What will happen if you connect the two cubes together?** (Volunteers respond.) **Try it!** (The children do this.)

Say: **You just made a rectangular prism. Look at your rectangular prism. How many faces does your rectangular prism have?** Pause as children count the faces on their rectangular prisms. Repeat for the vertices and edges.

Magic Math Moment

Count by Fives and Tens

Say: **Let's count to one hundred by fives.** Count orally by fives with the children to one hundred. Indicate the numbers on the Number Line if necessary.

Continue: **Let's do that again, but this time we will create a pattern with our voices as we count. The pattern rule will be loud voice, soft voice (**or another pattern of your choice**).** Count orally by fives to one hundred alternately using a loud and a soft voice.

Say: **Now let's count to one hundred by tens.** Do this.

Continue: **Let's do that again, but this time we will create in a pattern with our fingers as we count. The pattern rule will be ten finger wiggle high, ten finger wiggle low (**or another pattern of your choice**).** Count orally by tens to 100 alternately wiggling ten fingers high and wiggling ten fingers low.

Counting & Cardinality

CC.4 - Count to 100 by twos and by fives.

Operations & Algebraic Thinking

OA.1 - Identify, describe, or extend simple patterns.

Geometry

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

A.2 - Correctly name shapes.

A.3 - Identify shapes as two- or three-dimensional.

B.4 - Analyze and compare two- and three-dimensional shapes.

Introduce the Cone

Materials

☐ 3-D Shape Cards: *cone, cube, cylinder, pyramid, rectangular prism, sphere*

☐ 3-D wooden or plastic shapes

☐ One cone math net diagram

☐ *Backpack Bear's Math Big Book*, pages 9–11

☐ Drawing paper, pencils, crayons

1 ### Review the Cube and the Rectangular Prism

Indicate the 3-D Shape Cards or wooden/plastic shapes: *cone, cube, cylinder, pyramid, rectangular prism,* and *sphere*.

Display *Backpack Bear's Math Big Book*, page 9.

Indicate the 3-D Shape Rhyme. Ask: **Who can find one of the three-dimensional shapes we have learned?** A volunteer does this.

Say: **Let's see if we can remember the properties of this shape. Where could we look to remind us?** (Volunteers respond.) **Right, we can check the next page!** (Do this.)
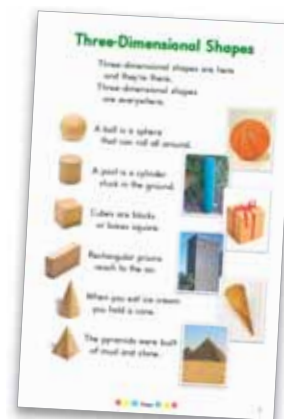
Review the properties of the chosen shape.

Continue: **Who can find the other three-dimensional shape we learned?** A volunteer does this.

Say: **Right, we learned about the rectangular prism. Let's check page 8 to remind us of a rectangular prism's properties.** (Do this.) **A rectangular prism has six faces, eight vertices, and twelve flat edges.**

2 Introduce the Cone

Say: **Today we will learn about another three-dimensional shape.**

Indicate the cone. Say: **Look at this shape. Who knows what it is called?**

Explain: **We call this three-dimensional shape a *cone*. Say, *cone*.**
(Children repeat, *cone*.) **A *cone* has a circular flat base, one curved side, one vertex, and one curved edge.**

3 Introduce the Cone Math Net

Indicate the *cone* math net diagram and continue: **Look at this math net diagram. Remember, a math net diagram is a pattern of shapes that when folded together makes a three-dimensional shape.** Ask:

- **What two-dimensional shape do you see?**
- **Do you see any other two-dimensional shapes?**
- **Why is the other shape NOT a triangle?**

Explain: **There are only two straight lines and a triangle has three. Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.
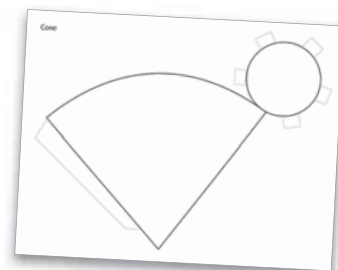
4 The Properties of a Cone

Display *Backpack Bear's Math Big Book*, page 11.

Indicate the cone. Say: **This page shows properties of a cone.** Ask:

- **Who can point to the curved side of the cone?**
- **Who can point to a vertex?**
- **Who can point to a circular base?**
- **Who can point to a curved edge?**

Briefly discuss the properties outlined.

Formative Assessment

Name Cone-Shaped Objects

Distribute drawing paper, pencil, and crayons.

Ask: **Who can think of something that is shaped like a cone?** (ice cream cone, traffic cone, birthday hat, Christmas tree)

Write "Cones" on a whiteboard and instruct the children to copy it on their papers as a title.

As children name cone-shaped objects, the class draws pictures on drawing paper and labels them. Backpack Bear may make suggestions if the children have difficulty naming cone-shaped objects.

Learning Centers

❶ Computer

The children explore:

- Monthly Calendar
- Geometry and Measurement: "2-D/3-D Sort"
- Geometry and Measurement: "2-D/3-D Shapes"
- Geometry and Measurement: "3-D Space"

Materials
- ☐ Computers navigated to *Starfall.com*

Measurement & Data

MD.1 - Identify and use time measurement tools.

Geometry

A.2 - Correctly name shapes.

A.3 - Identify shapes as two- or three-dimensional.

B.4 - Analyze and compare two- and three-dimensional shapes.

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❷ Play Dough Shape Town

Children create a "Shape Town" on math mats using play dough and 3-D Shape Cards (*cube, rectangular prism, cone*) as models.

Materials
- ☐ Cubes, rectangular prisms, cones
- ☐ Math mats
- ☐ Play dough
- ☐ 3-D Shape Cards

❸ "Shape Town"

Players draw from a deck of 2-D Shape Cards or spin the spinner and move to the next corresponding shape on the Shape Town game board.

Play continues until the first player reaches the star, or play may continue until all players reach the star.

Materials
- ☐ "Shape Town" game board
- ☐ 2-D Shape Cards or 2-D shape game spinner
- ☐ Playing pieces

❹ Teacher's Choice

Prepare an activity that will provide the children with an opportunity to practice a skill from this unit.

⑤ "Race to 20"

The first player spins, identifies the number, and moves his or her playing piece the corresponding number of spaces.

Players take turns until one reaches 20. The players may repeat the game as time permits.

As the children play "Race to 20" choose individual children to skip count by tens. Record the last number each child counts to correctly on the Summative Assessment Checklist for Unit 6, Week 13.

Materials

- ☐ "Race to 20" game board
- ☐ Spinner with numbers 1-5
- ☐ Playing pieces
- ☐ Summative Assessment Checklist Unit 6, Week 13

Week 14 Summary

The children will continue their study of three-dimensional shapes, as they more closely examine their properties and begin to notice three-dimensional shapes in their environment. The children will also:

- Identify three-dimensional shapes by their physical properties
- Identify the number that is "one less" or "one more"

Preparation

Collect several objects for Backpack Bear's contribution to the 3-D Shape Museum, plus additional three-dimensional objects to extend this lesson if children forget to bring items from home. Suggestions include: **Cylinder** — soup can or frozen juice carton, **Spheres** — cherries or a small ball, **Cone** — ice cream cone, party hat, **Cube** — cube of cheese, dice, cube-shaped tissue box.

DAY 1

Use chart paper and 3-D Shape Cards *cone* and *cylinder* to create a Cone and Cylinder Venn diagram similar to the one pictured.

Create a set of Representation Cards for numbers 1 – 10 by combining numbers, dice, domino, tally marks, and ten-frame cards. You will also need a bag of everyday objects shaped like a cube, rectangular prism, cone, and cylinder.

Cut out one *cylinder* math net diagram in preparation for today's lesson.

You will also need 3-D Shape Picture Cards: *traffic cone, ice cream cone, crayon, party hat, packing box, block, covered box, dice, drum, twine, thread,* and *pole*, and 3-D Shape Cards: *cone, cylinder, rectangular prism,* and *cube* for today's Formative Assessment.

DAY 2

You will need a small amount of play dough for each child. You will also need 3-D Shape Picture Cards: *clock, button, disc, dots, basketball, marble, globe,* and *ball of yarn* in a small bag, 2-D Shape Card: *circle*, and 3-D Shape Card: *sphere*.

Note: There is no math net diagram for the sphere.

DAY ❸
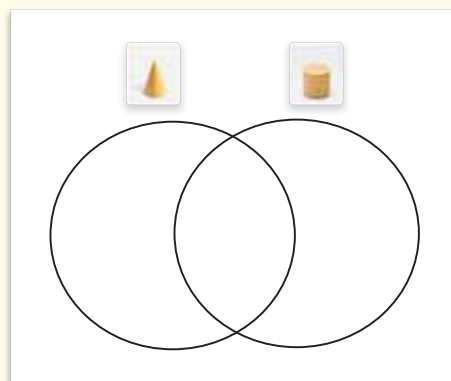
You will use four sets of 3-D Shape Cards: *cube, cone, rectangular prism, sphere, pyramid,* and *cylinder*.

Cut out one *square pyramid* math net in preparation for today's lesson.

DAY ❹

The children will sort the items they and Backpack Bear brought for the 3-D Shape Museum.

DAY ❺

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

Activity Center 2 — The children will sort 2-D and 3-D Picture Cards, and 2-D and 3-D Shape Cards. They will need two hula hoops or math mats labeled "2-D" and "3-D."

Activity Center 3 — The children will use a "Find That Shape!" game board, playing pieces, and a game spinner labeled with 3-D shapes.

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

Summative Assessment — You will use a set of 3-D Picture Cards *cone, cube, rectangular prism, cylinder, sphere,* and *square pyramid*. You will also need six brown paper bags that each contain one three-dimensional shape.

Prepare a copy of the Summative Assessment Checklist for Unit 6 – Week 14.
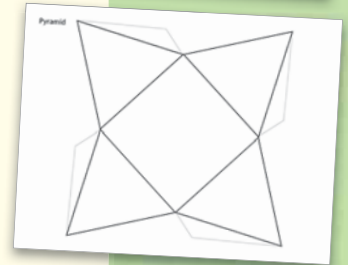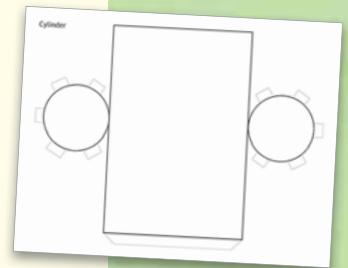
Math Net Diagrams
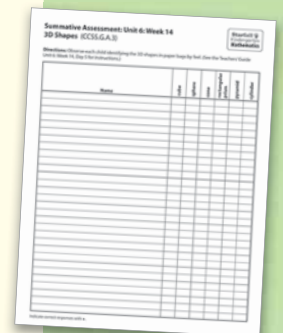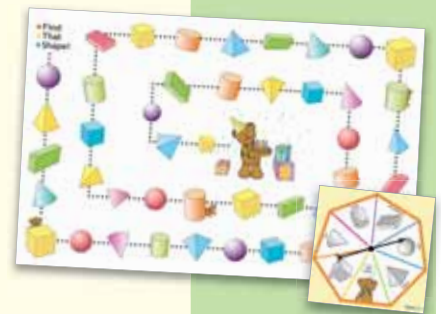
Summative Assessment
Unit 6 - Week 14

	DAY 1	DAY 2
Daily Routines	• Calendar • Place Value • Weather • Hundreds Chart • Number Line	
Magic Math Moment	Seeing number patterns	One less
Math Concepts	Distinguish numbers using representation cards ***Introduce*** 3-D Shapes: *Cylinder* Cylinder math net Compare cones and cylinders	Demonstration of "one less" Review 2-D Shapes: *triangle, rectangle, circle, square* Review 3-D Shapes: *cube, rectangular prism* ***Introduce*** 3-D Shapes: *Sphere*
Formative / Summative Assessment	Identify 3-D shapes	Identify sphere-shaped objects
Workbooks & Media		

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

Learning Centers

One more	One less	
		1 *Starfall.com:* • Monthly Calendar • Geometry and Measurement: "2-D/3-D Sort" • "2-D/3-D Shapes" • "3-D Space"
Use pennies and ten-frames to demonstrate "one more" Review 3-D Shapes: *cube, rectangular prism, cone, cylinder, sphere* ***Introduce*** 3-D Shapes: *Square pyramid* Square pyramid math net	Use the Number Line to determine "one less" 3-D Shape Museum: • Review shapes • Set up categories • Sort objects by shape	**2** Sort 2-D and 3-D shapes
Use 3-D shapes to create patterns	Discuss 3-D Shape Museum category properties/count objects in each category	**3** Find That Shape!
		4 Teacher's Choice
Backpack Bear's Math Big Book "Shape Rhyme" page 9		**5** Summative Assessment: 3-D Shapes — Identify objects by feel and sight

Magic Math Moment

Seeing Number Patterns

Display Number Cards 1-10 in various locations in the classroom.

Distribute the dice, domino, tally mark, and ten-frame Picture Cards to children.

Select 5 children to bring their cards forward, identify the number representations, and then stand near the Number Cards that matches their Representation Cards.

Continue until all of the cards are sorted.

Discuss how recognizing these patterns helps us recognize the number more quickly than counting to determine how many.

Counting & Cardinality

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

Geometry

B.4 - Analyze and compare two- and three-dimensional shapes.

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

Introduce the Cylinder

1 Introduce the Cylinder

Indicate the cylinder. Say: **Look at this object. We call this three-dimensional shape a *cylinder*. Say, *cylinder*.** (Children repeat, *cylinder*.)

Continue: **We know it is a cylinder because it has 1 curved side and 2 faces: A flat circular base** (indicate)**, and a circular top** (indicate)**. It has two curved edges around the faces.** (indicate) **A cylinder doesn't have any vertices.**

2 Introduce the Cylinder Math Net

Indicate the cylinder math net diagram. Say: **Look at this math net diagram. Remember, a math net diagram is a pattern of shapes that when folded together creates a three-dimensional shape.** Ask:

- **What two-dimensional shape do you see?**
- **Do you see any other two-dimensional shapes?**

Continue: **Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.
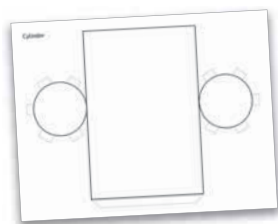
❸ Properties of a Cylinder

Display *Backpack Bear's Math Big Book*, page 11.

Indicate the cylinder. Say: **Here is a picture that shows the properties of a cylinder.**

Ask:

- **Who can point to the curved side of the cylinder?**
- **Who can point to the circular base?**
- **Who can point to the circular top?**
- **How about the curved edges?**

Briefly discuss the properties outlined.

Indicate the *cone* and *cylinder* Venn diagram. Volunteers explain ways in which a cone and a cylinder are alike, and how they are different. Write their responses on the diagram.
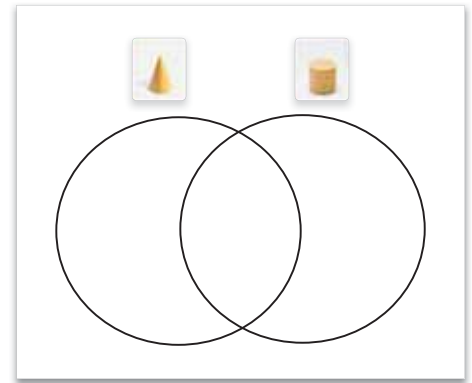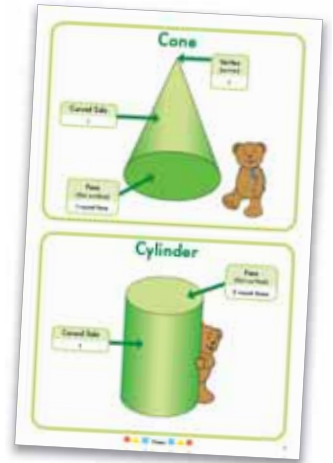
🔁 Formative Assessment

Match Cylinders

Assign a 3-D Shape Card (*cone, cylinder, rectangular prism, cube*) to four children and instruct them to stand in different locations.

Choose volunteers to draw 3-D Shape Photo Cards then stand next to the children holding the corresponding 3-D Shape Card.

Magic Math Moment

One Less

Materials
☐ None

Choose 5 volunteers to come to the front of the classroom. Say: **Here are 5 children. Let's count.** (Do this.) **If one child leaves, how many children will be left? Let's see.** (One child leaves.) **How many children are left? Right, 4. Four is one less than 5.** The four children return to their places.

Choose 10 volunteers to come to the front of the classroom. Say: **Let's count how many children there are.** (Do this.) **If one child leaves there will be one less child.** (One child leaves.) **How many children are left? Right, 9. Nine is one less than 10.**

Continue: **Look at the number line (**or calendar**). Find the number 8. What is one less than 8?** (Volunteers respond.) **How did you know?**

Repeat with the numbers 20, 15, and 12.

Introduce the Sphere

Materials
☐ Individual whiteboards, markers
☐ Play dough for each child
☐ *Backpack Bear's Math Big Book,* page 12
☐ Pocket chart
☐ 3-D Shape Photo Cards: *clock, button, disc, dots, basketball, marble, globe, ball of yarn* in a small bag
☐ 2-D Shape Card: *circle*
☐ 3-D Shape Card: *sphere*

1 Review 2-Dimensional Shapes

Distribute whiteboards and markers to the children.

Say: **Backpack Bear would like to know if you remember the shapes you have learned. He will whisper the shape he would like you to draw on your whiteboard. Ready? (**Backpack Bear pretends to whisper.**) Backpack Bear said, "Square." Hold up your drawing when you are finished.**

Repeat for *circle, triangle,* and *rectangle.*

2 Review 3-Dimensional Shapes

Say: **Backpack Bear has one more shape for you to draw. Ready? It's a cube.**

Ask: **Why can't you draw a cube?**

Explain: **A cube is not a flat shape. You can't draw all sides of something that isn't a flat shape on a flat whiteboard. What could we use to create a cube? (**Volunteers respond.**) Let's use play dough.**

Collect the whiteboards and markers, and distribute a small amount of play dough to each child.

Instruct the children to create a cube and then a rectangular prism.

3 **Introduce the Sphere**

Say: **Backpack Bear would like you to create a ball with your play dough.** The children do this.

Explain: **Today we will learn about a shape that looks like a ball.**

Indicate a sphere. Say: **Look at this object. We call this three-dimensional shape that looks like a ball a *sphere*. Say, *sphere*.** (Children repeat, *sphere*.)

Continue: **A *sphere* has no flat areas, no edges, and no vertices. It is round on every side. Why is the ball or sphere you made from play dough not a circle? Right, a circle is flat and the sphere you created is not.**

Display *Backpack Bear's Math Big Book*, page 12.

Indicate the sphere. Say: **Here is a picture that shows the properties of a sphere. A sphere has no vertices and no edges. All points are the same distance from the center.** Briefly discuss the properties outlined on page 10.
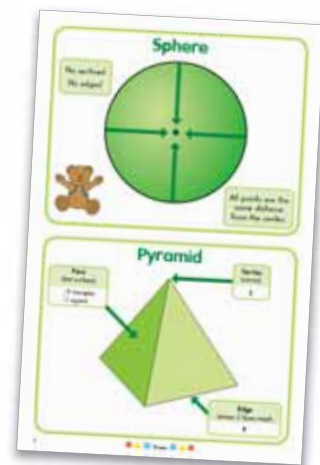
4 **Compare Circles and Spheres**

Place the circle and sphere Shape Cards in the top row of a pocket chart as headings.

The children take turns to draw Photo Cards from the bag, name them, tell if they are circles or spheres, and explain why.

Then they place the cards in the pocket chart under the correct heading.

Formative Assessment

List Spheres

Say: **Our earth is a sphere. Can you think of other things that are shaped like spheres?** Encourage the children to use the language: "A (blank) is a sphere because (blank)."

Optional: Make a list of sphere-shaped object names on the whiteboard.

Magic Math Moment

One More

Materials

☐ Math bags

Distribute math bags and instruct the children to remove their ten-frames and 10 pennies.

Say: **Place 5 pennies on your ten-frame.** (The children do this.) **If you want 6 pennies on your ten-frame, how many more pennies should you add?** (Volunteers respond.)

Explain: **Right, 6 is one more than 5, so you should add 1 penny. Add one penny to your ten-frame. Now you have 6 pennies. Count them to make sure.**

Continue: **How many more pennies should you add to have 7 cents? Right, 7 is one more than 6, so you should add one more penny.** (The children do this.) **Now, clear your ten-frame.**

Say: **Watch as I write an equation on the board.** Write 9 cents + 1 cent = _____ .

Say: **Use your ten-frame and your pennies to solve this addition problem.** (Assist the children as necessary to do this.) **Now, clear your ten-frame.**

Repeat for 4 cents + 1 cent = _____ .

Introduce the Square Pyramid

1 ### Review 3-Dimensional Shapes

Materials

☐ *Backpack Bear's Math Big Book*, pages 9 and 12

☐ Square pyramid

☐ Square pyramid math net diagram

☐ Four sets of 3-D Shape Cards: *cone, cube, cylinder, pyramid, rectangular prism, sphere*

Display *Backpack Bear's Math Big Book*, page 9.

Indicate and read the 3-D Shapes Rhyme. Ask: **Which three-dimensional shapes have we learned about so far?**

Indicate a square pyramid. Say: **Look at this object. We call this three-dimensional shape a *square pyramid*. Say, square pyramid.** (Children repeat, *square pyramid*.) **A *square pyramid* has four triangular faces and one square face.**

Say:

- **How many faces does a square pyramid have altogether?** Indicate and count the five faces.

- **Let's count how many vertices it has.** Indicate and count the five vertices.

- **A square pyramid has several flat edges. Let's count them.** Indicate and count the eight flat edges.

2 Introduce the Square Pyramid Math Net

Indicate the square pyramid math net diagram. Say: **Look at this math net diagram. Remember, a math net diagram is a pattern of shapes that when folded together creates a three-dimensional shape. What two-dimensional shapes do you see?**

Continue: **Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.
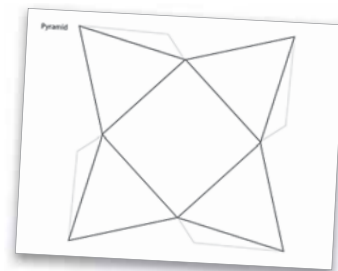
3 Properties of a Square Pyramid

Display *Backpack Bear's Math Big Book*, page 12 and indicate the square pyramid. Say: **Here is a picture that shows the properties of a square pyramid.**

Ask:

- **Who can point to the faces on the square pyramid?**
- **Who can point to a vertex?**
- **How about an edge?**

Say: **It would be fun to have a three-dimensional shape museum! A museum is a place where items are displayed for people to see. When you get home, ask your parents to help you find objects that look like three-dimensional shapes. Bring them to school and we will use them for some fun activities!**
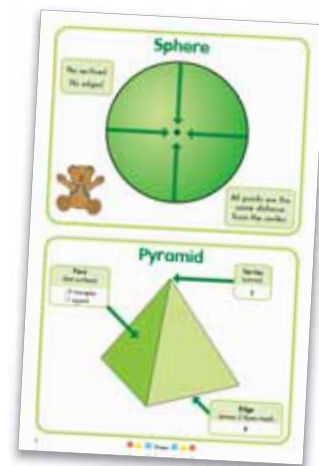
Formative Assessment

Shape Patterns

Display one set of the *cone, cube, cylinder, pyramid, rectangular prism,* and *sphere* Shape Cards side-by-side in the top row of a pocket chart. Display the remaining sets of cards in the bottom pocket, side-by-side.

Say: **Let's make a pattern. Our rule will be ABCDEF. The pattern will be *cube, cone, rectangular prism, cylinder, sphere, square pyramid.*** Volunteers choose the Shape Card that continues the ABCDEF pattern from the bottom row of the pocket chart. As each card is placed, the volunteer identifies the shape and names one of the properties of that shape.

Note: If this pattern is too challenging, use the 3-D Shape Cards you would like to review to create a shorter pattern.

When the pattern is complete, the class turns to face the opposite direction until you remove one of the Shape Cards. Clap twice to indicate it is time for the class to turn back around. Ask: **What shape is missing?** Volunteers respond. The class turns around and the volunteer removes another card from the pattern. Repeat as time allows.

Magic Math Moment

One Less

Distribute an individual whiteboard and marker to each child.

Say: **Look at the Number Line and find the number 15.** (The children do this.) **What number is one less than 15?** Assist the children by indicating 15 with a pointer then moving the pointer to 14 to show one less.

Explain: **Right, 14 is one less than 15. This time I will say a number. You write the number that is one less on your whiteboards and hold them up when you are finished. Ready?** Repeat with the numbers 5, 9, and 20. Pause to allow the children time to write their responses before indicating the numbers that are one less on the Number Line.

Say: **Here is a challenge for you! What is one less than 31?**

3-D Shape Museum Day

Materials
☐ 3-D Shapes: *cube, rectangular prism, cone, cylinder, sphere, square pyramid*
☐ Items collected for the 3-D Shape Museum (including Backpack Bear's collection)

Essential Question: *How are shapes important and how are they used in our environment?*

1 Setting Up Categories

Define an area in your classroom where you can sort the items children and Backpack Bear brought in for the 3-D Shape Museum.

Indicate and identify the 3-D shapes (*cube, rectangular prism, cone, cylinder, sphere,* and *square pyramid*) and place each shape in its own space.

2 Sorting Items

Distribute the items for the children to sort.

Each child places one of his or her items in the appropriate 3-D shape category. Continue until all of the items have been sorted.

Formative Assessment

Sort Items Into Groups

Lead the children to discuss why certain items do not belong in certain groups. Ask questions like: **Why doesn't the party hat belong in the cylinder group?**

Divide the children into six groups, and assign each group one of the 3-D shapes. The children count the number of items in each 3-D shape group and determine which 3-D shape has the most or least number of items, or if any of the shapes have the same number.

If space allows, display the shapes for reference during **Week 15**.

Learning Centers

1 Computer

The children explore:

- Monthly calendar
- Geometry and Measurement: "2-D/3-D Sort"
- Geometry and Measurement: "2-D/3-D Shapes"
- Geometry and Measurement: "3-D Space"

Materials

- ☐ Computers navigated to *Starfall.com*

2 Sorting Shapes

The children sort the Picture Cards into two groups (two-dimensional shapes and three-dimensional shapes) and place them in the hula hoops or on the sorting mats.

The children then sort the Shape Cards according to shape, and place them within the hula hoop or on sorting mats. (Example: All cone pictures together, triangle pictures together, etc.)

If time allows, the children place all the Picture Cards and Shape Cards face down and play "Concentration."

Materials

- ☐ 2-D and 3-D Picture Cards (mixed)
- ☐ 2-D and 3-D Shape Cards (mixed)
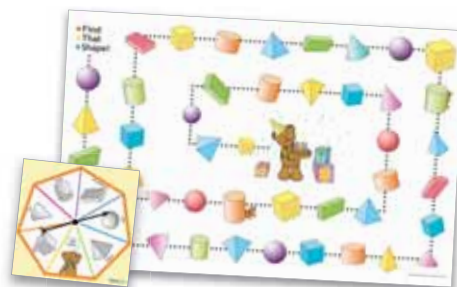- ☐ Two hula hoops or two sorting mats labeled "2-D" and "3-D"

3 "Find That Shape!"

Players spin the spinner or draw from the deck of 3-D Shape Cards and move their playing pieces to the next corresponding shape on the game board.

Play ends when the first player reaches Backpack Bear at the end, or play may continue until all players reach Backpack Bear.

Materials

- ☐ "Find That Shape!" game board
- ☐ Playing pieces
- ☐ 3-D Shape Cards or game spinner labeled with 3-D shapes

4 Teacher's Choice

Prepare an activity that will provide the children with an opportunity to practice a skill from this unit.

5 Summative Assessment: 3-D Shapes

Select one child and flash the 3-D Picture Cards to him or her, and the child identifies each shape. During this assessment children only identify shapes by name. Record responses on the Summative Assessment Checklist.

As you do this, one of the remaining children in the group selects a paper bag. He or she reaches into the bag and attempts to identify the shape by its feel. He or she removes the shape from the bag, and the group confirms or corrects the guess. The children put the bag aside and the next child chooses from the remaining bags. The children continue until they have all had a turn.

Materials

- [ ] Summative Assessment Checklist for Unit 6, Week 14
- [ ] 3-D Shape Cards: *cone, cube, rectangular prism, cylinder, sphere, square pyramid*
- [ ] Six brown paper bags each containing one 3-D shape (one shape per bag)

Week 15 Summary

The children will review 2-D and 3-D shapes and their properties, and use their knowledge to distinguish the difference and to complete many of the activities in **Week 15**.
The children will also:

- Estimate length with cubes
- Predict whether 3-D shapes will roll, stack, or slide
- Graph shapes and interpret the results
- Sort 2-D and 3-D shapes

Preparation

Collect several small boxes (shoe boxes) for each group of three or four children.

DAY 1

You will read *Backpack Bear's Treasure Hunt* to the children.

The children will use drawing paper, pencils, and crayons to draw a "shape picture" for Backpack Bear.

DAY 2

Prepare a Shape Prediction Chart similar to the one pictured.

You will need enough bags of 3-D wooden or plastic objects for each small group of three or four children to have its own. You will also need an individual whiteboard and a small box (shoe box) for each group, and one for demonstration.

We Predict that a ____ will...	Roll	Stack	Slide
Cone			
Cube			
Cylinder			
Rectangular Prism			
Sphere			
Square Pyramid			

DAY 3

You will use 4 sets of 3-D Shape Cards. If you have more than 24 children, you may also use real 3-D shapes to make up the difference, so that each child has either a 3-D Shape Card or a shape.

DAY ④

Gather several classroom objects, such as a book, ruler, yardstick, and school bag, and several connect cubes for the children to practice their measuring skills.

Prepare a label that reads "2-D Shapes" and one that reads "3-D Shapes" for use in today's sorting activity.

DAY ⑤

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

Activity Center 2 — The children will need a set of 3-D Picture Cards, play dough, and their math mats.

Activity Center 3 — The children will need play dough or several miniature marshmallows, toothpicks, math mats, and a set of 3-D Picture Cards. If you are using miniature marshmallows and toothpicks, be sure to place them in a plastic bag for each child.

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

Summative Assessment — The children will play "Find That Shape!" as you perform individual Summative Assessments. They will need a "Find That Shape!" game board, playing pieces, and a Starfall spinner labeled with 3-D shapes.

Prepare a copy of the Summative Assessment Checklist for Unit 6, Week 15.

Summative Assessment
Unit 6 - Week 15

	DAY 1	DAY 2
Daily Routines	• Calendar • Place Value • Weather • Hundreds Chart • Number Line	
Magic Math Moment	Subtraction story problems	Counting on
Math Concepts	Act out subtraction story problems Review 2-D/3-D Shapes *Backpack Bear's Treasure Hunt* (rebus book) Identify shapes	Count on from various numbers (instead of starting at 1) Review 3-D Shapes "Roll, Stack, Slide" – make predictions about 3-D shapes Test shapes to determine if each 3-D shape rolls, stacks, or slides
Formative / Summative Assessment	Draw presents for Backpack Bear incorporating shapes	Record results of "Roll, Stack, Slide" and interpret results
Workbooks & Media		

DAY 3	DAY 4	DAY 5
• Calendar • Place Value • Weather • Hundreds Chart • Number Line		**Learning Centers**
"Looby Loo"	Estimate length	*Starfall.com:* **1** • Monthly Calendar • Geometry and Measurement: "2-D/3-D Sort" • "2-D/3-D Shapes" • "3-D Space"
Sing "Looby Loo" and perform actions Sing "Looby Loo" inserting names of 3-D shapes Graph 3-D shapes	Estimate length or objects/use cubes to measure Classify 2-D/3-D shapes by properties	Play dough 3-D shapes **2**
		Construct 3-D shapes **3**
Interpret 3-D Shape Graph	Distinguish 2-D/3-D shapes	Teacher's Choice **4**
Math Melodies CD Track 14, "Looby Loo" Workbook page 46	Workbook page 47	"Find That Shape!" **5** Summative Assessment — Properties of 3-D Shapes

Magic Math Moment

Act It Out: Subtraction

Distribute an individual whiteboard and marker to each child.

Say: **Today let's act out subtraction story problems. Listen carefully.** Choose seven volunteers to act out the following story problem.

- **Seven birds were in a tree.** Instruct the volunteers to stand together and flap their wings to act like birds.
- **Three flew away.** If necessary, help the children decide which three will "fly away."
- **How many birds were left in the tree?** Volunteers respond.
- **Let's count the remaining birds to be sure.** Count the four remaining children.
- **Write the equation for this subtraction story problem on your whiteboard horizontally. How many birds were in the tree to start?** (Write 7.) **How many flew away?** (Write -3.) **How many birds were left?** (Write = 4.)

The seven volunteers return to their seats. Choose eight different volunteers for the next subtraction story problem.

- **Eight children were riding bikes.** The eight volunteers pretend to ride bikes.
- **Two of the children needed to go home.** If necessary, help the children decide which two will "go home."
- **How many children were still riding their bikes?** Volunteers respond.
- **Let's count them to be sure.** Count the six remaining children.

Review the story problem. Children write the equation on their whiteboards horizontally (8 − 2 = 6).

Backpack Bear's Treasure Hunt

1 Review 2- and 3-Dimensional Shapes

Place the 2-D and 3-D Shape Cards face down in a pocket chart.

A volunteer reveals a Shape Card, identifies the shape, then chooses the next volunteer to do the same. Continue until all of the Shape Cards have been revealed and identified.

2 Introduce *Backpack Bear's Treasure Hunt*

Indicate *Backpack Bear's Treasure Hunt.* Say: **Today we will read a book titled *Backpack Bear's Treasure Hunt*! This book was written and illustrated by Faith Gowan.**

Ask: **What do you think this book is about? Raise your hand if you know what a treasure hunt is. What do you think the treasure might be?** (Volunteers respond.) **Let's read to find out!**

Explain that this is a rebus-style book, which means there are pictures in place of some of the words throughout the story. As you read, the children may participate in the reading by saying the names of the shapes indicated in the text.

3 Identifying Shapes

Say: **Now, let's see if you remember the names of the shapes.**

Indicate the shapes on pages 16 and 17. The children take turns identifying them.

Formative Assessment

Draw Shapes

Distribute drawing paper. Say: **Let's draw a present for Backpack Bear. Since he helped teach you about shapes, include as many shapes in your drawing as possible.**

If time allows, children share their drawings with the class.

Magic Math Moment

Counting On

Say: **Raise your hand if you can say the name of a number that is on the Number Line.** A volunteer does this.

Choose a number on the Number Line. Ask: **Who can say the name of a number that is larger than (**chosen number**)?** A volunteer does this.

Choose a second number. Say: **Let's begin at (**first number**) and count on to (**second number**). Ready?** Use a pointer to indicate the starting number and touch each successive number as the children count on.

Repeat several times with new volunteers.

Counting & Cardinality

A.2 - Count forward from a given number.

Geometry

A.2 - Correctly name shapes.

Estimation

E.2 - Make predictions to determine reasonable answers.

"Roll, Stack, Slide"

Materials

☐ Prepared 3-D Shape Prediction Chart

☐ 1 wooden or plastic cone, cube, rectangular prism, pyramid, sphere, cylinder (for demonstration)

☐ Whiteboard and box (for prediction)

☐ Whiteboard and box for each group

☐ Bag with 3-D wooden or plastic shapes for each group

☐ Crayons or sticky notes

1 Review 3-D Shapes

Indicate each three-dimensional wooden shape individually several times (*cone, cube, rectangular prism, pyramid, sphere,* and *cylinder*) and choose volunteers to identify them.

2 Make Predictions

Say: **Today we will make *predictions*. Remember, *predictions* are smart guesses.**

Indicate the 3-D Shape Prediction Chart. Say: **Let's examine, or look at, each shape and make a prediction about whether that shape will roll, slide, stack, or a combination of these.**

Demonstrate the meaning of "roll," "stack," and "slide" using a whiteboard and box.

3 **The Class Predicts**

As a prediction is made about each shape, a volunteer comes to the chart and writes "Y" for yes or an "N" for no.

Say: **Here is a cone.**

- **Do you think this cone can roll?**
  A volunteer writes "Y" or "N" next to the cone under "roll."

- **Do you think this cone can stack?**
  A volunteer writes "Y" or "N" next to the cone under "stack."

- **Do you think this cone can slide?**
  A volunteer writes "Y" or "N" next to the cone under "slide."

Repeat for the cube, cylinder, rectangular prism, sphere, and square pyramid.

4 **Testing the Predictions**

Say: **Now let's test our predictions.**

Divide the class into groups of three or four. Each group tests a shape using a ramp (a whiteboard or other item propped up on a box). If you have enough shapes to give each group a set, groups may test their shapes simultaneously. If you do not have enough shapes for each group to have a set, assign a 3-D shape to each group.

Discuss the results as a group.

Formative Assessment

Recording the Results

Gather the children back near the Prediction Chart.

Say: **Let's look at the Prediction Chart. We predicted that a cone would (**stack, roll, or slide**).** Color the boxes that show the results, or use sticky notes to cover the boxes.

Continue: **Here is a cone. Did the cone slide?** (Volunteers respond.) **Yes, it did, so let's color in the slide box.** Do this.

- **Did it stack?** (Volunteers respond.) **No, it did not, so we won't color the stack box.**

- **Did it roll?** (Volunteers respond.) **Yes, so let's color in the roll box.**

- **How well did we predict if a cone would roll, stack, or slide?**

Continue for each shape.

Magic Math Moment

"Looby Loo"

Project *Starfall.com*, Motion Songs: "Looby Loo," or play the *Math Melodies* CD, Track 14. Encourage the children to sing along and perform the actions in the song.

Materials
- [ ] *Starfall.com:* Motion Songs, "Looby Loo" or *Math Melodies* CD, Track 14

Operations & Algebraic Thinking

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

Measurement & Data

MD.2 - Use and interpret graphs.

Geometry

A.2 - Correctly name shapes.

B.4 - Analyze and compare two- and three-dimensional shapes.

Graphing Shapes

Materials
- [ ] 4 sets of 3-D Shape Cards (**Note:** If you have more than 24 children, use real 3-D shapes to make up the difference)
- [ ] *Backpack Bear's Math Workbook #1*, page 46
- [ ] Pencils, crayons
- [ ] *Backpack Bear's Math Big Book*, pages 9-12

1 "Looby Loo" with Shapes

Gather the children in a circle and distribute a 3-D shape to each child.

Explain: **We will sing "Looby Loo" but I will name a shape rather than part of your body, like arm or leg. When you hear the name of the shape you are holding, jump in and out of the circle with your shape.** Repeat the song for each shape.

2 3-D Shapes Poem

Display *Backpack Bear's Math Big Book*, page 9. Read the 3-D Shapes poem. Read it a second time and encourage the children to join you.

Briefly review the properties of each 3-D shape using pages 10, 11, and 12.

3 Graphing 3-D Shapes

Distribute *Backpack Bear's Math Workbook #1* and instruct the children to turn to page 46. Assist them to locate the page as needed.

Note: Project the workbook page for demonstration if possible, as it is suggested that the children complete the page together. Volunteers may take turns coloring in the projected graph, as the other children complete their workbook pages. Decide whether to have the children place an X on the items they have graphed.

Say: **Look at all the shapes in the top box. Can you tell quickly how many rectangular prisms there are?** (Volunteers respond.) **We will use a graph to help us learn how many of each shape there are.**

Formative Assessment

Interpret Results

Lead the children to interpret the results of the graph by asking:

- **Which shape has the least number?**
- **Which shape has the most?**
- **Did more than one shape have the same number?**
- **How did graphing the shapes help us learn how many of each shape there are in the larger box?**

Magic Math Moment

Estimating Length with Cubes

Prior to today's Magic Math Moment, lay Backpack Bear on a table in the front of the classroom.

Say: **Today let's see how well we can estimate the length of objects, or how long they are. We will start with Backpack Bear!**

Indicate the cubes. Continue: **Look at this cube and estimate how many cubes long Backpack Bear might be.** (Volunteers respond.) **I think Backpack Bear might be about 6 cubes long. What could we do to test our estimates? Right, we could measure Backpack Bear using the cubes.** Discuss the results.

Ask: **Was your estimate too high or too low?** Volunteers respond. Repeat the measuring procedure using other classroom objects. First, ask the class to estimate how many cubes long the object is. Then a volunteer uses cubes to test their estimation.

Measurement & Data

A.1 - Describe measurable attributes of objects.

Geometry

A.2 - Correctly name shapes.

B.4 - Analyze and compare two- and three-dimensional shapes.

Estimation

E.1 - Understand the meaning of estimation.

Classifying 2-D and 3-D Shapes

❶ Sorting 2-D and 3-D Shapes

Place the labels "2-D Shapes" and "3-D Shapes" in the top row of a pocket chart and read them to the children.

Ask: **What is the difference between a 2-D shape and a 3-D shape?** (Volunteers respond.) **Today we will classify, or sort, Picture Cards into two groups: 2-D pictures and 3-D pictures.**

Distribute a 2-D or 3-D Picture Card to each child. (Some children may have more than one.)

- Choose 4 volunteers to move to the pocket chart.
- Each volunteer shows his or her Picture Card to the class and tells if it pictures a 2-D or a 3-D shape.
- The volunteers place their Picture Cards under the appropriate labels.
- The class confirms the answers or offers suggestions for other placement.

Repeat until all of the Picture Cards have been sorted.
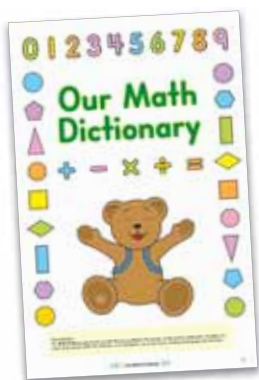
② Shape Hunt

Indicate B*ackpack Bear's Math Big Book,* pages 47-56. Say: **This is *Backpack Bear's Math Dictionary.* Who can tell us what a dictionary is?** Volunteers respond.

Lead children to understand that a dictionary is where we look to find what words mean and how to spell them.

Continue: **This is a special dictionary because it has only math words in it. Let's use it to go on a Shape Hunt!**

Volunteers take turns to look through the dictionary and find two- and three-dimensional shapes. They name them and explain how they identified each shape.

⇄ Formative Assessment

Distinguishing 2-D and 3-D Shapes

Distribute *Backpack Bear's Math Workbook #1* and instruct the children to turn to page 47. Explain: **Cut out the shapes at the bottom of the page and decide if each shape is a 2-D shape or a 3-D shape. Then you will glue the shapes in the correct boxes.**

If time allows, instruct the children to turn to the last page of the workbook and write their names on the Mastering Math Award. They then color Backpack Bear.

As children are working, sign your name or use Backpack Bear's "paw" stamp as your signature. Write the date on the board and the children copy it.

Learning Centers

1 Computer

The children explore:

- Monthly calendar
- Geometry and Measurement: "2-D/3-D Sort"
- Geometry and Measurement: "2-D/3-D Shapes"
- Geometry and Measurement: "3-D Space"

Materials
- ☐ Computers navigated to *Starfall.com*

2 Play Dough 3-D Shapes

The children shuffle the 3-D Picture Cards and place them face down in a stack. One child turns a card. The children look closely at the card and use play dough to construct the shape on their math mats.

Repeat with the children taking turns to reveal cards and constructing the corresponding three-dimensional shapes.

Materials
- ☐ 3-D Picture Cards
- ☐ Play dough
- ☐ Math mats

3 Constructing 3-D Shapes

The children take turns choosing 3-D Picture Cards and constructing each shape using toothpicks and miniature marshmallows or small balls of play dough on their Math Mats.

Materials
- ☐ Miniature marshmallows or balls of play dough
- ☐ 3-D Picture Cards
- ☐ Toothpicks
- ☐ Math mats

4 Teacher's Choice

Prepare an activity that will provide the children with an opportunity to practice a skill from this unit.

5 Summative Assessment: "Find That Shape"

Players draw from the deck of 3-D Shape Cards and move their playing pieces to the next corresponding shape on the game board.

Play ends when the first player reaches Backpack Bear at the end, or play may continue until all players reach Backpack Bear.

As the children play the game, individually ask each of them to indicate the vertex, edge, and face of each shape. Record responses on a Summative Assessment Checklist for Unit 6 – Week 15.

Materials
- ☐ "Find that Shape!" Game board
- ☐ Game spinner labeled with 3-D shapes
- ☐ Playing pieces
- ☐ Summative Assessment Checklist Unit 6, Week 15
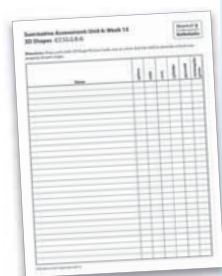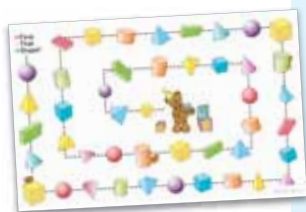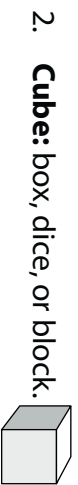
Dear Parents,

We are learning about the properties of the following 3-dimensional shapes: **Cone, Cube, Cylinder, Sphere, Pyramid, and Rectangular Prism.**
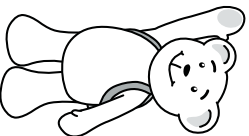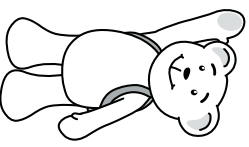
We are creating a 3-dimensional museum in our classroom. Please help your child look around the house for items that are the shapes mentioned above. You are not restricted to the examples given below. You may send in as many items as you like.
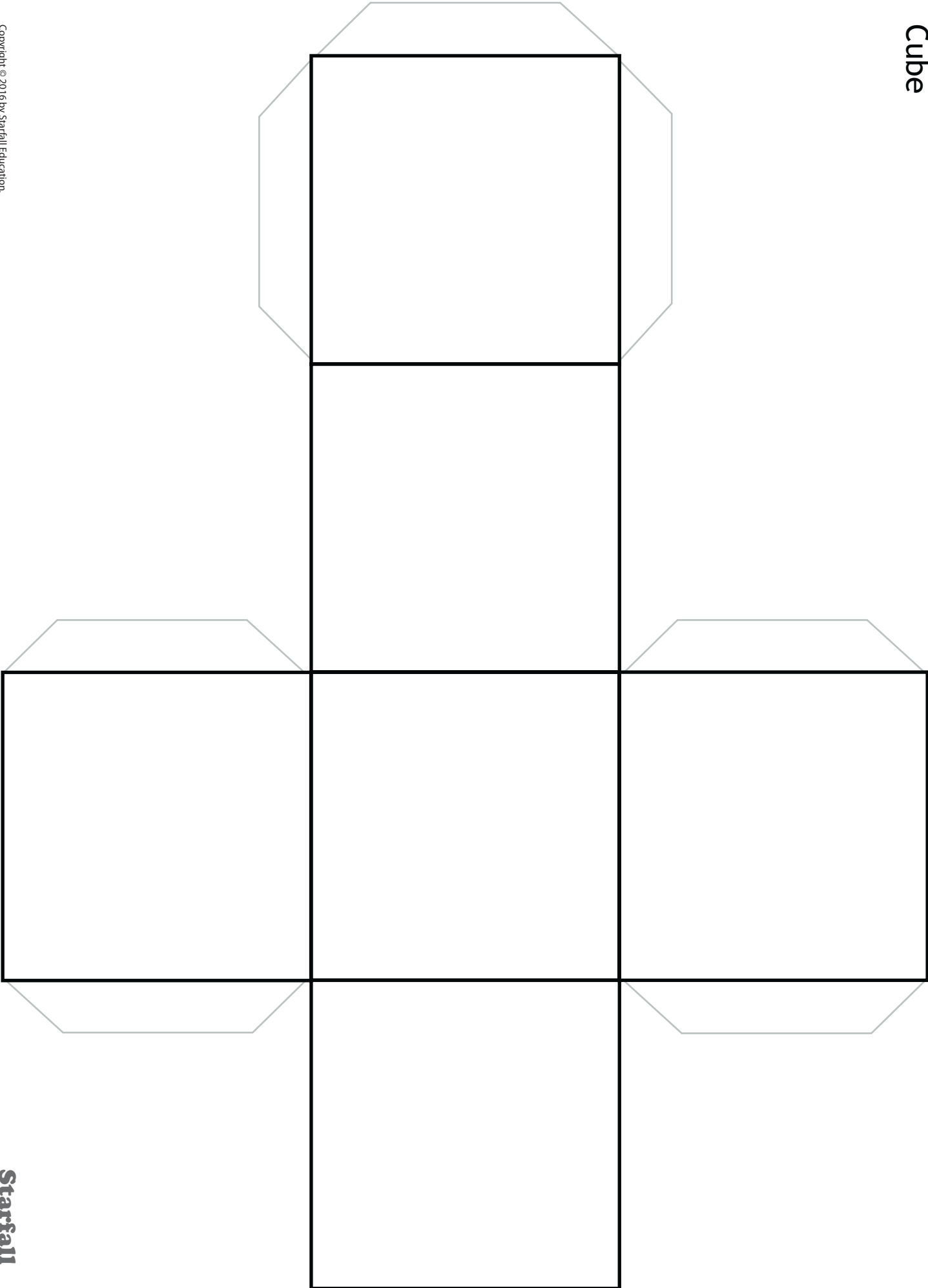
1. **Cone:** party hat, ice cream cone, or pencil point.

2. **Cube:** box, dice, or block.

3. **Cylinder:** can, marker, cup, or mug.

4. **Sphere:** marble, gum ball, or ball.

5. **Pyramid:** pyramid shaped candle.

6. **Rectangular prism:** tissue box, cereal box, or camera.

Please be sure to send the items in a bag labeled with your child's name on this date: _____ .

Thanks!