Starfall
Kindergarten
MATHEMATICS

2-D and 3-D Shapes

Starfall Education Foundation
P.O. Box 359, Boulder, CO 80306

Starfall
Kindergarten
MATHEMATICS

UNIT **6**

2-D and 3-D Shapes

Week 14

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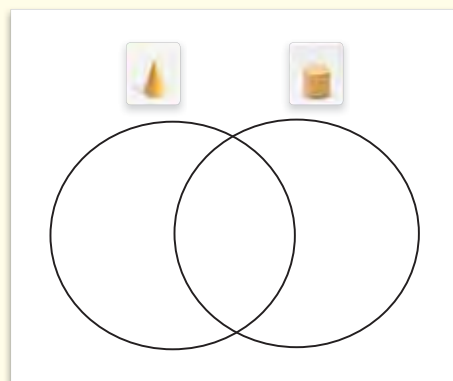
You will use four sets of 3-D Shape Cards: *cube, cone, rectangular prism, sphere, pyramid,* and *cylinder*.

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.
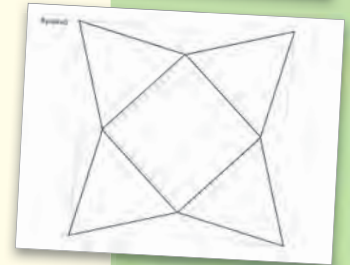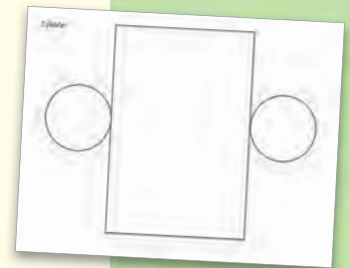
Math Net Diagrams
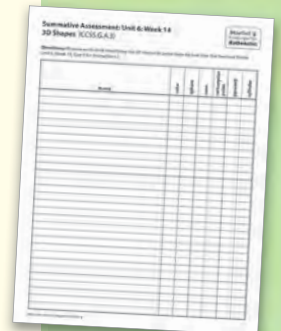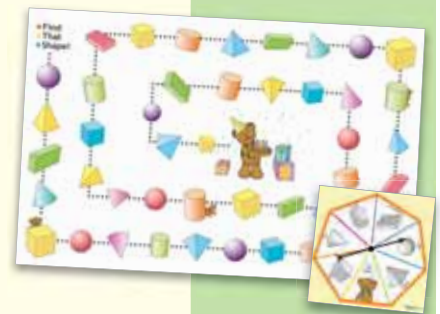
Summative Assessment
Unit 6 - Week 14

	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		

DAY ③	DAY ④	DAY ⑤
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
		3 Find That Shape!
Use 3-D shapes to create patterns	Discuss 3-D Shape Museum category properties/count objects in each category	**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.
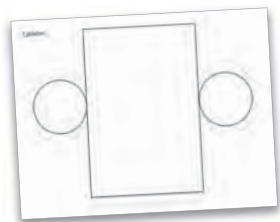
3 **Properties of a Cylinder**

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.
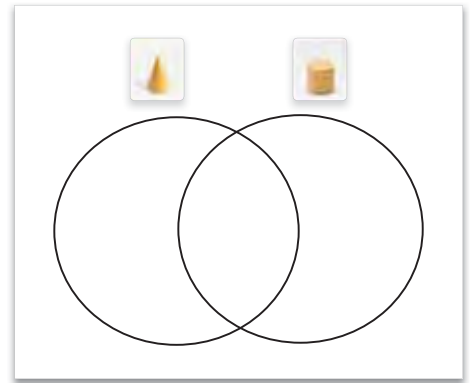
Formative Assessment

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.
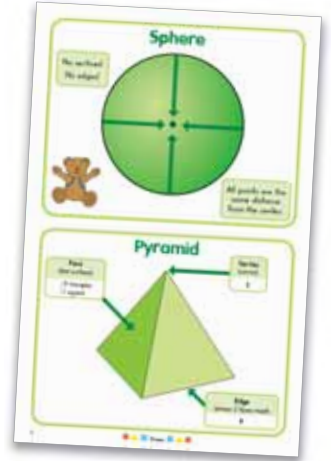
4 **Compare Circles and Spheres**

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

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 = _____ .

Operations & Algebraic Thinking

A.2 - Solve word problems with addition and subtraction within 10.

Geometry

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

A.2 - Correctly name shapes.

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

B.6 Compose simple shapes to form larger shapes.

Introduce the Square Pyramid

① Review 3-Dimensional Shapes

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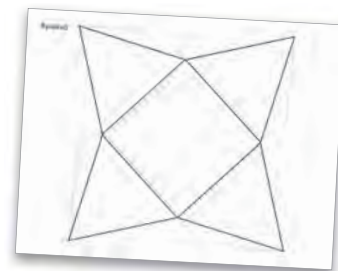
Continue: **Let's fold this math net diagram together and see what three-dimensional shape it makes.** The children watch as you demonstrate how to fold the math net diagram.

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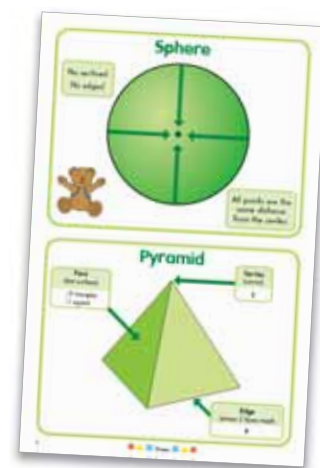
- **Who can point to the faces on the square pyramid?**
- **Who can point to a vertex?**
- **How about an edge?**

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)

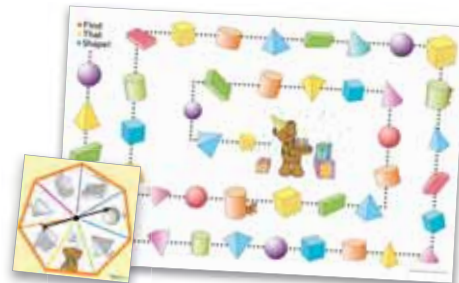☐ Two hula hoops or two sorting mats labeled "2-D" and "3-D"

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**

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)

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.