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

If you have questions or comments, please contact us.

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2-D and 3-D Shapes

Starfall Education Foundation
P.O. Box 359, Boulder, CO 80306
2-D and 3-D Shapes

Week 13

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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.

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

**DAY 1**

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 2**

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 3**

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 4**

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 5**

*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.
### Daily Routines
- Calendar
- Weather
- 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
- Distinguish 2-D shapes by their properties
- Properties of a cube

### Formative / Summative Assessment
- Starfall.com, Geometry & Measurement: “Triangle”
- Starfall.com, Geometry & Measurement: “2-D/3-D Shapes”

### Workbooks & Media
- Backpack Bear’s Math Big Book “Shape Rhyme” page 9
### DAY 3
- Calendar
- Weather
- Number Line

### DAY 4
- Place Value

### DAY 5
- Hundreds Chart

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- Count rolls of dice
- Review the cube and its properties
- **Introduce** Rectangular Prism
- Rectangular prism math net

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- Using cubes to create a rectangular prism
- Real objects shaped like cones

- **Backpack Bear’s Math Big Book**
  - “Shape Rhyme” page 9

- “Race to 20”
- Summative Assessment - Skip Counting by tens
Daily Routines

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

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

**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.

**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.

**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?

#### Materials

- Number Cards: 11-20
- Pocket chart

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#### Shape Properties

### 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 & 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.**

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#### 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.

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#### 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”
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.

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.

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.
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.

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.

Introduce Three-Dimensional Shapes


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.
**Introduce Dice**

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.

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**Introduce the Rectangular Prism**

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

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.
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.

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.


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.

**Materials**

None

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**Introduce the Cone**

**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.


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.*

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**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.

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**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
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.
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”

2. **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.

3. **“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.

4. **Teacher’s Choice**

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