

Compare Two-Dimensional and Three-Dimensional Objects

Lessons for Grades K–1

Overview of Lesson

Students learn to differentiate between two- and three-dimensional shapes. They draw two-dimensional shapes and use clay to create three-dimensional shapes.

Mathematical Goals

Students will:

- Differentiate between three-dimensional and two-dimensional objects.
- Communicate ideas with key math vocabulary: cone, cube, cylinder, face, solid figure, flat figure.

Materials

- A set of geometric solids
- Cubes, Cones, Cylinders & Spheres by Tana Hoban
- Cut outs of triangles, squares, circles, and rectangles
- A bag to hold both the solid figures and the flat ones
- Large construction paper folded in half, labeled circle on the left and sphere on the right; enough for each student
- Large construction paper folded in half, labeled triangle on the left and cone on the right
- Clay
- A set of wooden blocks

Vocabulary

Cone

Cube

Cylinder

Face

Solid figure

Flat figure

Triangle

Circle

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Teaching Directions

DAY 1

Identify Flat and Solid Shapes

We've been identifying different shapes this week. Today we will think about shapes in a new way.

Demonstrate the attributes of dimension. Display a cube and a square drawn on a piece of paper. Engage students in a discussion about their similarities and differences.

What is the same about these two shapes? (Possible answers: they both are kind of square)

Point to the cube and trace one face explaining that the face is a square. Give each pair of students a cube.

How many square faces does the cube have? (6)

It may help to allow the students to put a small sticker on each face as they count the faces on the cube, so they don't count any of the faces twice or forget any.

Then point to the square. Give each student a square piece of paper. Place a square piece of paper on the table next to a cube.

I notice that the paper square is flat and the cube is not flat. It is solid. We call it a solid figure.

Show a rectangular prism (a non-cube box) and point out that

To measure the box we would need to measure how long it is, how wide it is, and how high it is. You need to make three measurements. That is why we say that solids are three-dimensional. Sometimes we shorten three-dimensional and say that it is 3-D.

Display a rectangle.

How many measurements do we have to make to measure the rectangle? (2)
Yes, we measure how long and how wide. We need two measurements to measure flat figures. We say that they are two-dimensional. Sometimes we abbreviate it and say they are 2-D.

Take a shape walk.

Review with students the names of solid figures and flat figures. From a bag filled with solids and flat figures, take out one at a time, and have students call out together "flat" or "solid", or "2-D" or "3-D."

Compare Two-Dimensional and Three-Dimensional Objects, Lessons for Grades K–1, continued

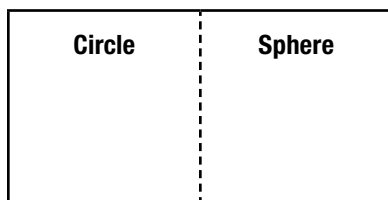
Once you are sure that students can differentiate between solids and flats, take the students on a shape walk around the school. Point to objects such as circles painted on the playground and cylinder-shaped trash bins.

Is this a solid or a flat? (Answers will vary depending on the objects you point to around the school.)

Make solid shapes.

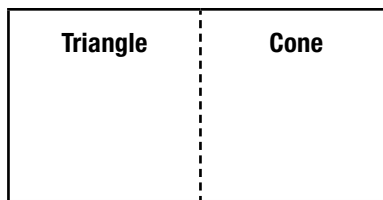
Now you will have a chance to make some solid shapes and draw some flat shapes. First we'll make spheres. What flat shape is kind of like a sphere? (circle)

Provide a piece of paper that has been folded in half and labeled Sphere and Circle. First have them write their names on the bottom of the pages. Explain that students will use a piece of clay to make a sphere and they will use a crayon to draw a circle. Provide each student with a piece of clay.



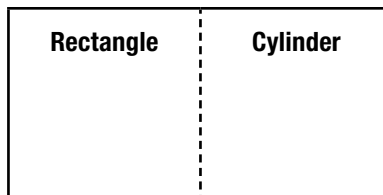
When students finish, have them place their papers along a shelf or some area where they can be displayed.

Follow this same process for cone and triangle and then cube and square.



Choose one student at a time to describe one of the clay figures and pictures using the correct mathematical name for both shapes. Also have them point out which is solid and which is flat.

If time allows, you can also have them make a cylinder and a rectangle.



DAY 2

Compose Three-Dimensional Shapes

Today we will work with solid shapes. We'll put them together to make new shapes.

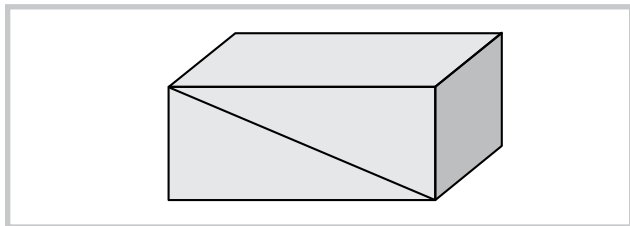
Demonstrate by displaying two triangular prism blocks.

If I put them together, I can make a new shape.

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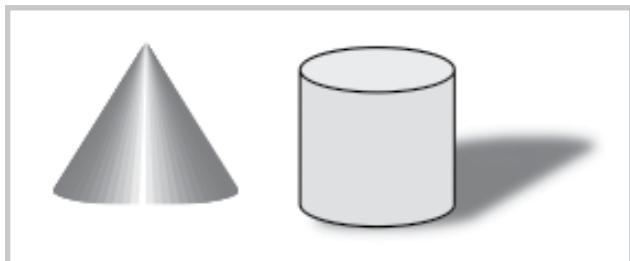
Put them together to make a rectangular prism.



This looks like a box. What shape is the face? (rectangle) We call it a rectangular prism because the faces are rectangles.

Display a cylinder and a cone.

Sometimes we can put solids together without naming the shape.



Place the cone on top of the cylinder.

What does this look like? (Possible answers: a tower, a silo, a water tower)

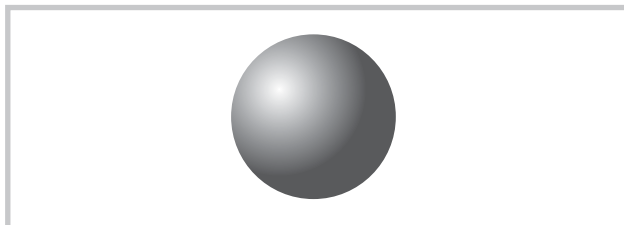
Provide blocks at each table of four children. Have them work in pairs to create several shapes. Challenge the students to make a bridge with three blocks. Then have them construct a double-decker bridge

with six blocks. Challenge them to make stairs or a ramp for the bridge.

Then have them make a building structure of their choice with a roof.

After each item is built, have students describe their structures and how they made them. Encourage them to use the correct mathematical terms for the shapes. (Example: I put two rectangular prisms standing up and then I put a long one across the top to make a bridge.)

Extensions Spheres



Have students make spheres with clay. Then, using plastic knives or craft sticks, have them cut their spheres in half.

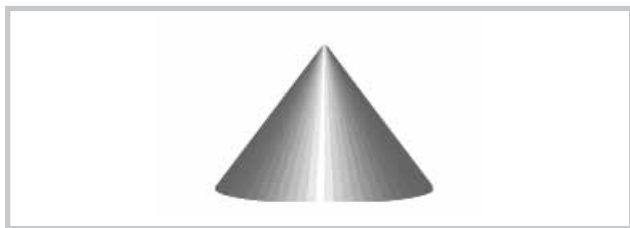
What shape do you see on the flat side. (circle)

Explain that we call a half-sphere a hemisphere.

Next, have them cut their halves in half.

What shapes do you see now? (the shapes of the flat faces are like triangles, but with a curved base)

Cones



Demonstrate cutting a cone in half. Display a cone made of clay that you prepared earlier.

Ask students what they think the flat side will look like if you cut it straight down from top to bottom. (triangle)

Then cut it in half vertically through the vertex and perpendicular to the base. Show the flat surface so that students will know if their prediction was correct.