

## Grade 8 Mathematics

### Geometry: Lesson 3

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol ( $\Rightarrow$ ) by them.

#### *Purpose of Lesson 3:*

- In this lesson, the tutor and the students will
  - ✓ identify and name 3-dimensional figures (rectangular solid, cylinder, cone, cube, pyramid, and sphere);
  - ✓ know the basic properties of 3-dimensional figures; and
  - ✓ relate 3-dimensional figures to their 2-dimensional parts.

#### *Equipment/Materials Needed:*

- Copies of Student Sheet 34
- A cylinder, cone, cube, pyramid, rectangular solid, and sphere. You can use objects from the real world or borrow these from a mathematics teacher.
- One paper clip or zip lock bag for each student
- Paper and pencils

#### *Preparations before beginning Lesson 3:*

- Run off one copy of Student Sheet 34 for each student. Cut out the figure names and the figures. Put each set in a zip lock bag or paper clip them together.
- Gather paper and pencils and 3-dimensional figures.

### Lesson 3: Geometry

⇒ Give the cut out pieces of Student Sheet 34 to the students. Place the cylinder, cube, rectangular solid, cone, pyramid, and sphere in front you.

Say:

**Look at the objects in front of me. How are these objects different from the polygons or plane figures we studied in the last lesson? (They are not flat; they have a height; and they are made up of the flat figures.) Some terms that we will use when we talk about 3-dimensional figures are *face*, *edge*, and *vertices*. A *face* is a flat surface or side of a solid figure. An *edge* is the line segment where two faces meet. *Vertices* are the corner points of a solid figure. The singular term for vertices is *vertex*. *Polyhedra* are 3-dimensional figures that are made up of polygons. The singular term for polyhedra is *polyhedron*. You have the pictures and names of the 3-dimensional objects. When I hold up an object, find the picture and the name. Some are polyhedra and some are not.**

⇒ Hold up the rectangular prism. Use a box of some sort, possibly a shoe box.

Say:

**Which object am I holding? (#6) Place the picture of it in front of you. What is its name? (rectangular solid or rectangular prism) A *prism* is a 3-dimensional figure with at least two faces that are congruent and parallel. For two faces to be *congruent*, they must be the same size and same shape. A rectangular prism has rectangular bases. It is okay if they call the rectangular prism a rectangular solid. What plane figures do you see in it? (rectangles and possibly squares) How many rectangles make up a rectangular prism? (6) If I set the rectangular prism flat on the table, what would it look like from above? (a rectangle or possibly a square)**

⇒ Hold up the cube. You can use a box, but all of the sides must be squares.

Say:

**This object is a special type of rectangular prism. What is special about it? (All of the faces are squares.) Place the picture of it in front of you. (#3) What is its name? (cube) What plane figures do you see in it? (squares)**

**How many squares make up the cube? (6) If I set the cube flat on the table, what would it look like from above? (a square)**

⇒ Hold up the pyramid. This object may be hard for you to find. You may need to get one from the mathematics teacher. Pyramids can be very different. They all have triangular faces, but the bases can be any polygon. If you can get two different kinds, it would be helpful.

Say:

**Which object am I holding? (#2) Place the picture of it in front of you. What is its name? (pyramid) A pyramid is a type of polyhedra. It is made of polygons, but it is not a prism. It has one base that is a polygon and all of its faces are triangles. The base can be a triangle, a square, a hexagon, etc. – any figure that is a polygon. However, the faces will always be triangles. Do you see any flat figures in this pyramid? (triangles and possibly a square, depending on the base)**

⇒ Hold up the cylinder. You can use a can for a cylinder.

Say:

**There are solid objects that are not polyhedra. They are not polyhedra because they have parts that are not polygons. What object am I holding? (#2) Place the picture of it in front of you. What is its name? (cylinder) Do you see any flat figures in it? (circles) The cylinder has two bases that are circles. These bases are the same size and same shape and they are parallel to one another. Since a circle is not a polygon, a cylinder is not a polyhedron.**

⇒ Hold up the cone. You can use an ice cream cone or a party hat.

Say:

**What object am I holding? (#1) Place the picture of it in front of you. What is its name? (cone) Is it a type of polyhedra? (No) Why? (It has a base that is not a polygon. It is a circle.) Do you see any flat figure in it? (a circle) A cone has one flat surface that is a circle.**

⇒ Hold up the sphere.

Say:

**What object am I holding? (#5) Place the picture of it in front of you. What is its name? (sphere) Do you see any flat figures in it? (No.) A sphere has no flat surfaces.**

Say:

**How are rectangular prisms and cubes alike?** (They are solid figures. They are polyhedra. They are 3-dimensional figures. They are prisms. They have bases that are rectangles. They have 6 faces, etc.) **How are they different?** (All of the faces of a cube have to be squares.)

**How are cubes and pyramids alike?** (They are solid figures. They are polyhedra. They are 3-dimensional figures.) **How are they different?** (All of the faces of a cube have to be squares. A pyramid has only one base and it can be any polygon. The faces on a pyramid are triangles, etc)

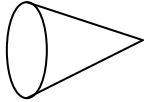
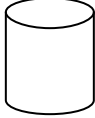
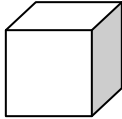
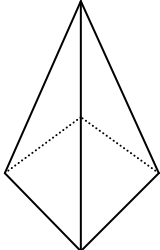
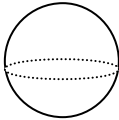
**How are cones and pyramids alike?** (They are solid figures. They are 3-dimensional figures. They both come to a point. They both have one base.)

**How are they different?** (The base on a cone is a circle, so it is not a polyhedron. The base on a pyramid can be any polygon, etc.)

You may want to continue asking these types of questions.

⇒ Have one student summarize today's lesson. See whether the students can come up with ways to remember the names of the solid figures.

**Student Sheet 34 (Geometry: Lesson 3)**

<b>Cylinder</b>	<b>Cone</b>	<b>Cube</b>
<b>Pyramid</b>	<b>Sphere</b>	<b>Rectangular Prism</b>
<b>1.</b> 	<b>2.</b> 	<b>3.</b> 
<b>4.</b> 	<b>5.</b> 	<b>6.</b> 