Contents

Geometric Solids are three-dimensional, solid shapes that children can use to investigate various mathematical concepts, such as shape identification, relational comparisons, and the properties of geometric shapes. They can also be used to introduce vocabulary and basic addition concepts. Except for the hemisphere, the Geometric Solids are all three inches tall.

The *Principles and Standards for School Mathematics* published by the National Council of Teachers of Mathematics were used as the foundation in developing the activities in this book. The *Standards* suggest that children in grades K-5 should be able to:

- Identify, compare, and analyze attributes of three-dimensional shapes and develop vocabulary to describe those attributes
- Classify three-dimensional shapes according to their properties
- Investigate, describe, and reason about the results of subdividing and combining shapes
- Identify and describe line symmetry in two- and three-dimensional shapes
- Identify and draw a two-dimensional representation of a three-dimensional object
- Use geometric models to solve problems in other areas of mathematics, such as number and measurement
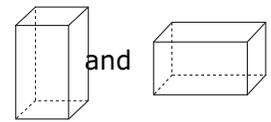
Using the Worksheets

The worksheets progress in a logical order, with each worksheet building on the knowledge gained from the previous worksheet. Some activities may require you to explain the exercises or introduce vocabulary. Drawings of the solids have been labeled on most worksheets to reinforce the names of the solids.

This book is written to be used with Learning Resources' Set of 10 Geometric Shapes (LER 0922). However, the worksheets can be used with any set of several geometric solids (a set of geometric solids should include most of the following: cube, rectangular prism, triangular prism, hexagonal prism, cylinder, square pyramid, triangular pyramid, cone, sphere, and hemisphere).

If you are using the Hands-On Soft Large Geometric Solids (LER 6121), you will find two slight differences: you are missing the Triangular Pyramid, and the Rectangular Prism is in a different shape.

Explain to the children that and represent the same solid.

Shaping Up

This exercise helps children to become familiar with the geometric solids. By beginning to work with the shapes through exploration of their bases, children will learn that different solids can have the same base. As the worksheet has space only for 4 solids, you may want to photocopy the worksheet two or even three times for each child, in order to allow them to explore as many of the solids as possible.

Pop-Up Shapes

This exercise, although fairly self-explanatory, moves children from their understanding of two-dimensional shapes to thinking about three-dimensional shapes.

Matching Madness

Once children have been introduced to three-dimensional shapes, they are ready to discover the attributes of those shapes. These worksheets require children to match a basic description of the solids with a picture of each solid. These matching exercises do not require any knowledge of specific vocabulary.

Odd One Out

These worksheets require children to apply what they have learned through initial exploration. Children will look at four solids, determine which one is different, and explain why it is different. You may want to introduce or review the vocabulary words *base, pyramid,* and *prism* before using these worksheets.

Describing and Matching Faces, Edges, and Vertices

These worksheets introduce children to the basic characteristics of geometric solids. Introduce these vocabulary words prior to beginning: *faces, edges,* and *vertices*. There are two worksheets for each concept. The first worksheet asks children to match a description using the new vocabulary to its picture. The second worksheet, with specific prompting questions (e.g., "How many faces can you count?"), requires children to build a description of each solid on their own. Each worksheet builds on the one before it, with the worksheet on vertices asking children about edges and faces as well as vertices. This section ends with a matching exercise about the round solids (i.e., cone, cylinder, hemisphere, and sphere).

Adding

These worksheets ask children to find the total number of faces or edges in two solids. The first two worksheets ask students to count the number of faces and edges on each solid and then add them together. The third asks students to build a structure from two solids and then to find the number of faces, edges, and vertices in the single structure. Some children may find it difficult to understand what is different about the last worksheet. Explain that when one solid is placed on top of another, the surfaces that touch each other should not be counted in the total number of faces because they are no longer visible.

Symmetry

Introduce lines of symmetry to the children and explain that the part of the solid on one side of the line is called one-half. When there are two lines of symmetry, the section bounded by the two lines is called one-fourth. Explain that some shapes may have many lines of symmetry. Challenge more advanced students to find as many lines of symmetry as they can.

Comparisons

These worksheets ask children to make direct comparisons between two solids. Most of the information will be a review of concepts and terms to which children have already been exposed; however, you may want to introduce the term *surface area* at the beginning of the lesson. Some children may have the math skills to measure one face of the solid and find the true area of the face or even to find the surface area of the entire solid. Younger or less experienced children should use the graph paper on page 30 to find the area of one face. You may want to suggest that they trace the shape onto the graph paper, color it in, and count the colored squares.

Perimeter

When introducing the concept of perimeter, explain that perimeter is the total length of the sides of a two-dimensional shape. Children should practice finding perimeter of faces of the solids. They can use the sheet of graph paper or a tape measure. Once they have some experience with smaller objects, encourage children to find objects in the classroom and measure their perimeters (for example, lunch boxes, desks, clocks, or even the classroom itself).
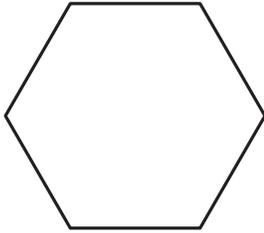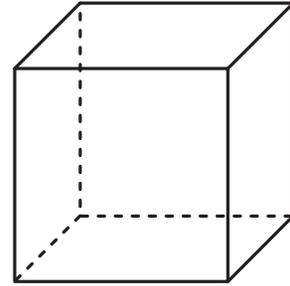
Pop-Up Shapes

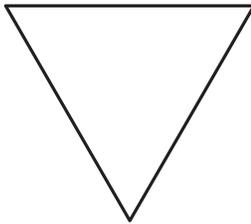Draw a line to match the flat shapes on the left with a 3D shape on the right.

1.

A.

2.

B.

3.

C.
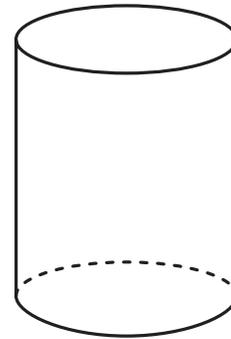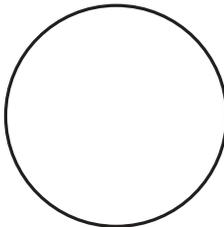
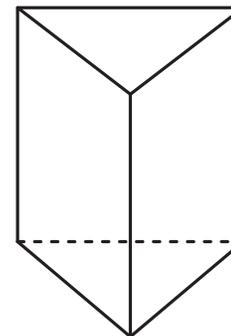**4.**

D.
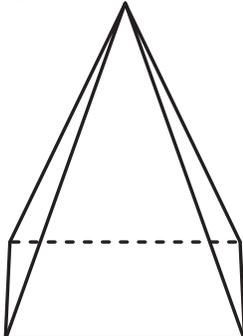
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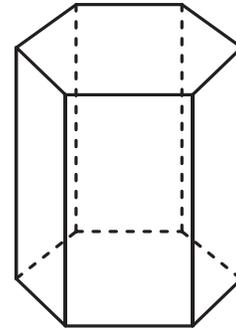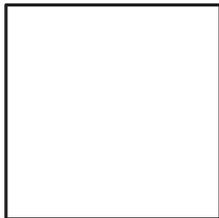
Odd One Out

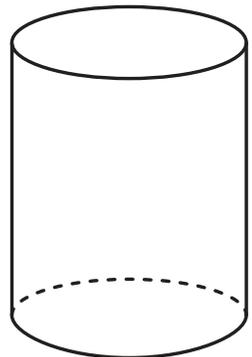One of these shapes is not like the others. Cross out the one that is different and write what is different about it.
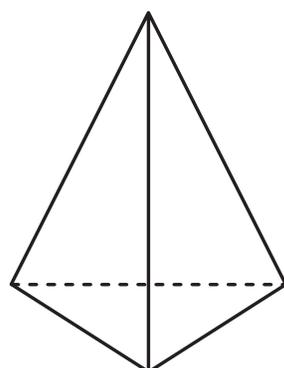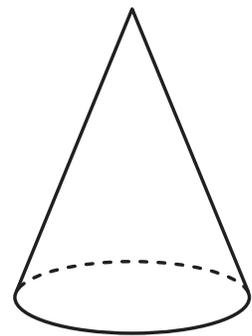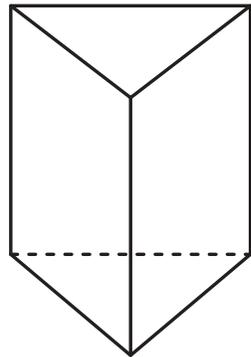
1.

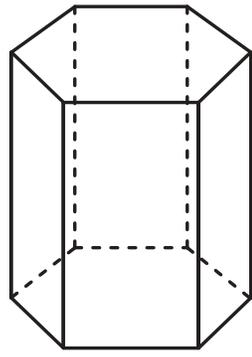| Square Pyramid | Cylinder | Triangular Prism | Cone |

What is different about the shape you crossed out? _____
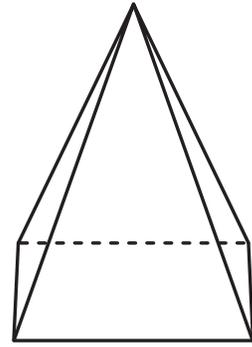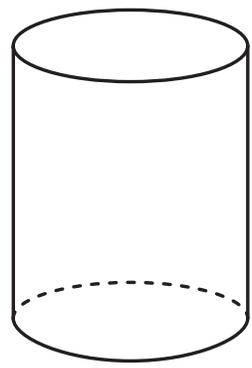
_____

2.

| Triangular Prism | Hexagonal Prism | Square Pyramid | Cylinder |

What is different about the shape you crossed out? _____
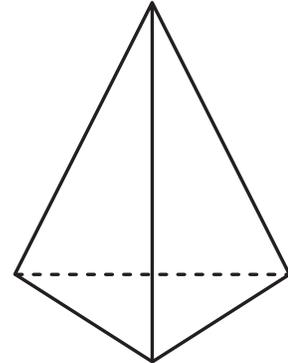
_____

LEARNING RESOURCES®

Comparing Pyramids

Find each of the solids pictured, and use them to complete the chart below.

Square Pyramid   Triangular Pyramid
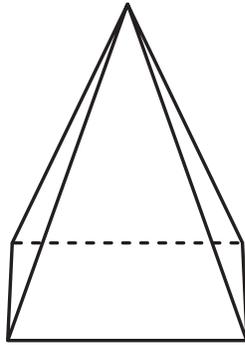
	Square Pyramid	Triangular Pyramid
Color	_____	_____
Number of faces	_____	_____
Number of edges	_____	_____
Number of vertices	_____	_____
Surface Area* of one side	_____	_____
Your own observations	_____	
	_____	
	_____	

***Surface Area** is the size of all the faces of the solid added together. You can use your graph paper to estimate the size of each face.