6.1 Drawing 3-Dimensional Figures



Essential Question How can you draw three-dimensional figures?

Dot paper can help you draw three-dimensional figures, or solids. Shading parallel sides the same color helps create a three-dimensional illusion.

Square Dot Paper

Isometric Dot Paper



Face-On View



Corner View

1 ACTIVITY: Finding Surface Areas and Volumes

Work with a partner.

Draw the front, side, and top views of each stack of cubes. Then find the surface area and volume. Each small cube has side lengths of 1 unit.



top		front			side			

Volume: 3 cubic units Surface Area: 14 square units



e.







ACTIVITY: Drawing Solids

Work with a partner.

a. Draw all the different solids you can make by joining four cubes. (Two have been drawn.) Cubes must be joined on faces, not on edges only. Translations, reflections, and rotations do not count as different solids.



b. Do all the solids have the same surface area? Do all the solids have the same volume? Explain your reasoning.

-What Is Your Answer?

- **3. IN YOUR OWN WORDS** How can you draw three-dimensional figures? Draw and shade two prisms that have the same volume but different surface areas.
- **4.** Maurits Escher (1898–1972) was a popular artist who drew optical illusions.
 - a. What is the illusion in Escher's drawing?
 - **b.** Why is the cartoon funny? What is the illusion in the cartoon?





©2008 M.C. Escher's "Ascending and Descending"



Use what you learned about three-dimensional figures to complete Exercises 7–9 on page 254.

6.1 Lesson





Pyramids

A pyramid is a polyhedron that has one base. The lateral faces are triangles.

Lateral face

Vertex

Base

Base

EXAMPLE

Drawing a Prism

Draw a rectangular prism.

Step 1

1

Step 2

Bases

Connect corresponding vertices.

Step 3

Lateral

surface

Change any hidden lines to dashed lines.



Draw identical rectangular bases.



Lateral

surface



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6.1 Exercises

Check It Out Help with Homework BigIdeasMath

Vocabulary and Concept Check

- 1. VOCABULARY Compare and contrast prisms and cylinders.
- 2. VOCABULARY Compare and contrast pyramids and cones.
- 3. WRITING Give examples of prisms, pyramids, cylinders, and cones in real life.

Identify the shape of the base. Then name the solid.





1

Practice and Problem Solving

Draw the front, side, and top views of the stack of cubes. Then find the surface area and volume.





Draw the solid.

- **2 10.** Triangular prism
 - **13.** Hexagonal pyramid
- **11.** Pentagonal prism
- **14.** Cone



- **12.** Rectangular pyramid
- **15.** Cylinder

18.

21.

Draw the front, side, and top views of the solid.



- **22. PYRAMID ARENA** The Pyramid of Caius Cestius in Rome is in the shape of a square pyramid. Draw a sketch of the pyramid.
- **23. RESEARCH** Use the Internet to find a picture of the Washington Monument. Describe its shape.



Draw a solid with the following front, side, and top views.



26. PROJECT Design and draw a house. Name the different solids that can be used to make a model of the house.



- 27. **REASONING** Two of the three views of a solid are shown.
 - **a.** What is the greatest number of unit cubes in the solid?
 - **b.** What is the least number of unit cubes in the solid?
 - **c.** Draw the front views of both solids in parts (a) and (b).
- **28.** Reasoning Draw two different solids with five faces.
 - **a.** Write the number of vertices and edges for each solid.
 - **b.** Explain how knowing the numbers of edges and vertices helps you draw a three-dimensional figure.



top

side