MAIN IDEA
Build three-dimensional figures given the top, side, and front views.

New Vocabulary
three-dimensional figure
face
edge
lateral face
vertex (vertices)
prism
base
pyramid
cone
cylinder
sphere
center

Math Online
glencoe.com
• Extra Examples
• Personal Tutor
• Self-Check Quiz

GET READY for the Lesson
Study the shape of each common object below. Then compare and contrast the properties of each object.

Many common shapes are three-dimensional figures. That is, they have length, width, and depth (or height). Some terms associated with three-dimensional figures are shown below.

Two types of three-dimensional figures are prisms and pyramids.

### Prisms and Pyramids

#### Properties
- **Prism**:
  - Has at least three lateral faces that are parallelograms.
  - The top and bottom faces, called the bases, are congruent parallel polygons.
  - The shape of the base tells the name of the prism.

#### Key Concept
- **Rectangular prism**
- **Triangular prism**
- **Square prism or cube**

#### Pyramid
- Has at least three lateral faces that are triangles.
- Has only one base, which is a polygon.
- The shape of the base tells the name of the pyramid.

#### Examples
- **Triangular pyramid**
- **Square pyramid**

### Differentiated Instruction
**Visual/Spatial Learners** While presenting the Key Concept box, have students create nets for a rectangular prism, triangular prism, square prism, triangular pyramid, and square pyramid to make visual connections to the properties for each figure. For example, by making a net for a square pyramid, students can visualize the three triangular surfaces and the one square surface of the pyramid.

### Scaffolding Questions
As you ask the following questions, point to a chalkboard eraser, cardboard box, or other rectangular prism.

Ask:
- What shape are the top and the bottom? rectangle
- Are the top and bottom parallel? yes
- How many sides does it have? 4
- Are the sides flat? yes
- How many vertices does it have? 8

### Prisms
Make sure students realize that the bases of a prism can be positioned toward the sides. Also make sure they realize that any pair of opposite faces of a rectangular or square prism can be the bases.
Some three-dimensional figures have curved surfaces.

### Cones, Cylinders, and Spheres

<table>
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<th>Properties</th>
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| Cone   | • Has only one base.  
         | • The base is a circle.  
         | • Has one vertex. |
| Cylinder | • Has only two bases.  
           | • The bases are congruent circles.  
           | • Has no vertices and no edges. |
| Sphere | • All of the points on a sphere are the same distance from the center.  
        | • No faces, bases, edges, or vertices. |

### Examples

**Classify Three-Dimensional Figures**

For each figure, identify the shape of the base(s). Then classify the figure.

1. The figure has one circular base, no edge, and one vertex.  
   - The figure is a cone.

2. The base and all other faces are squares.  
   - The figure is a square prism or cube.

3. **CAMERAS**  
   - Classify the shape of the body of the digital camera, not including the lens, as a three-dimensional figure.  
   - The body of the camera is a rectangular prism.

### Check Your Progress

- **a.** triangle; pyramid  
- **b.** circle; cylinder  
- **c.** cylinder

### Real-World Example

**CAMERAS**  
- Classify the shape of the zoom lens as a three-dimensional figure.
For each figure, identify the shape of the base(s). Then classify the figure.

1. square; square pyramid
2. triangle; triangular prism
3. circle; cylinder

4. SPORTS An official major league baseball has 108 stitches. Classify the shape of a baseball as a three-dimensional figure. sphere

5. triangle; triangular pyramid
6. rectangle; rectangular pyramid
7. square; square prism or cube

8. square; square pyramid

9. FOOD What three-dimensional figure describes the item at the right? cone

10. SCHOOL SUPPLIES Classify the shape of your math textbook as a three-dimensional figure. rectangular prism

11–13. See margin.
11–13. See margin.

14. SCHOOL SUPPLIES The model of the pencil shown is made of two geometric figures. Classify these figures. cylinder and cone

15. HOUSES The model of the house shown is made of two geometric figures. Classify these figures. triangular prism and rectangular prism

Exercise Levels
A: 5–10
B: 11–15
C: 16–19
6. triangle; triangular prism
7. rectangle; rectangular pyramid
8. square; square pyramid

11. trapezoid; trapezoidal prism
12. pentagon; pentagonal pyramid
13. octagon; octagonal prism

Additional Answers
11. trapezoid; trapezoidal prism
12. pentagon; pentagonal pyramid
13. octagon; octagonal prism

DIFFERENTIATED HOMEWORK OPTIONS

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<td>11–26 (optional: 27–29)</td>
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20. Which statement is true about all triangular prisms?  
   C  All of the edges are congruent line segments.  
   B  There are exactly 6 faces.  
   C  The bases are congruent triangles.  
   D  All of the faces are triangles.

21. Which figure is shown?  
   F  triangular pyramid  
   G  square pyramid  
   H  rectangular pyramid  
   J  triangular prism

22. MEASUREMENT Find the area of the figure shown at the right if each triangle has a height of 3.5 inches and the square has side lengths of 4 inches. (Lesson 11-6)  
   44 in²

23. MEASUREMENT Find the area of a circle with a radius of 5.7 meters. Round to the nearest tenth. (Lesson 11-4)  
   102.1 m²

ALGEBRA Find the missing angle measure in each quadrilateral. (Lesson 10-4)

24. 77°  
25. 53°  
26. 98°

16. REASONING Two sets of figures were sorted according to a certain rule. The figures in Set A follow the rule and the figures in Set B do not follow the rule. Describe the rule.

   | Set A | Prism | Pyramid | Cube |
   | Set B | Cylinder | Cone | Sphere |

17. CHALLENGE What figure is formed if only the height of a cube is increased? Draw a figure to justify your answer.  
   rectangular prism; See students’ work for justification.

18. OPEN ENDED Select one three-dimensional figure in which you could use the term congruent to describe the bases of the figure. Then write a sentence using congruent to describe the figure. See margin.

19. WRITING IN MATH Apply what you know about the properties of geometric figures to compare and contrast cones and pyramids. See margin.