LESSON 10-2
Reteach

Representations of Three-Dimensional Figures

An orthographic drawing of a three-dimensional object shows six different views of the object. The six views of the figure at right are shown below.

Top: [drawing]
Bottom: [drawing]
Front: [drawing]
Back: [drawing]
Left: [drawing]
Right: [drawing]

Draw all six orthographic views of each object. Assume there are no hidden cubes.

1. [drawing]

2. [drawing]
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Representations of Three-Dimensional Figures continued

An isometric drawing is drawn on isometric dot paper and shows three sides of a figure from a corner view. A solid and an isometric drawing of the solid are shown.

In a one-point perspective drawing, nonvertical lines are drawn so that they meet at a vanishing point. You can make a one-point perspective drawing of a triangular prism.

**Step 1** Draw a horizontal line and a vanishing point on the line. Draw a triangle below the line.

**Step 2** From each vertex of the triangle, draw dashed segments to the vanishing point.

**Step 3** Draw a smaller triangle with vertices on the dashed segments.

**Step 4** Draw the edges of the prism. Use dashed lines for hidden edges. Erase segments that are not part of the prism.

Draw an isometric view of each object. Assume there are no hidden cubes.

3. 

4. 

Draw each object in one-point perspective.

5. a triangular prism with bases that are obtuse triangles

6. a rectangular prism
**Practice A**

Representations of Three-Dimensional Figures

Draw all six orthographic views of each object (top, bottom, front, back, left, and right). Assume there are no hidden cubes. In your answers, use a dashed line to show that the edges touch and a solid line to show that the edges do not touch.

1. Top Bottom Front
   Back Left Right
2. Top Bottom Left
   Front Right Back

In an isometric drawing, every corner of a cube is on a dot in the grid.

3. Draw an isometric view of the object in Exercise 1.

5. Follow the steps to complete the drawing of a triangular prism in one-point perspective.
   a. Draw a dashed line from each vertex of the triangle to the vanishing point (point V).
   b. Use the dashed lines as guides to draw a triangle with sides parallel to the first triangle.
   c. Connect corresponding vertices of the two triangles. Use dashed lines for all hidden edges.

Determine whether each drawing represents the object at right. Assume there are no hidden cubes.

6. Yes
   7. No

**Practice B**

Representations of Three-Dimensional Figures

Draw all six orthographic views of each object. Assume there are no hidden cubes. In your answers, use a dashed line to show that the edges touch and a solid line to show that the edges do not touch.

1. Top Bottom Front
   Back Left Right
2. Top Bottom Front
   Left Right Front
3. Draw an isometric view of the object in Exercise 1.

5. Draw a block letter T in one-point perspective. Possible answer:
6. Draw a block letter T in two-point perspective. Possible answer:

Determine whether each drawing represents the object at right. Assume there are no hidden cubes.

7. Yes
   8. No

**Practice C**

Representations of Three-Dimensional Figures

Draw an isometric view of each object based on the orthographic views provided.

1. Front Top
   2. Top Right Left

The object shown is made up of three pieces. Each piece is made of one or more adjoining cubes. Assume there are no hidden cubes.

3. Assume each piece has a different shape and at least one piece is not a rectangular prism. Draw 3-D representations of the pieces.

4. Combine the three pieces you drew in Exercise 3 to make a rectangular prism. Draw the prism and shade the pieces so they can be distinguished.

5. Now suppose that two of the three pieces have the same shape. Draw the two same-shaped pieces. Then draw six possibilities for the third piece.

6. Four of the six possibilities you drew in Exercise 5 can form a 2-by-2-by-2 cube when joined together with another identical piece. Draw such a cube and shade the two pieces so they can be distinguished.

Possible answer:

**Reteach**

Representations of Three-Dimensional Figures

An orthographic drawing of a three-dimensional object shows six different views of the object. The six views of the figure at right are shown below.

Top: Bottom: Front:
Back: Left: Right:

Draw all six orthographic views of each object. Assume there are no hidden cubes.

1. Top: Bottom: Front:
   Back: Left: Right:

2. Top: Bottom: Front:
   Back: Left: Right:
**Problem Solving**

**Representations of Three-Dimensional Figures**

1. Describe the top, front, and side views of the figure.
   - **Top**: hexagon; **Front**: three rectangles; **Side**: two rectangles

2. Enrich used perspective to design the figure for a new logo. Describe the figure.
   - A one-point perspective drawing of a pentagonal prism

3. Which is a true statement about the figure?
   - A: The top view is a rectangle.
   - B: A side view is a rectangle.
   - C: A side view is a triangle.
   - D: The front view is a triangle.

4. Which three-dimensional figure has these three views?
   - **Top**: hexagon; **Front**: three rectangles; **Side**: two rectangles
   - A: Rectangular prism
   - B: Cube
   - C: Pentagonal prism
   - D: Hexagonal prism

5. Which drawing best represents the top view of the three-dimensional figure? Assume there are no hidden cubes.
   - **Possible answer:**

6. Which drawing best represents the side view of the building shown?
   - **Possible answer:**

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**Challenge**

**Investigating Antiprisms**

On this page, you will work with a type of polyhedron called an antiprism.

1. Trace the pattern below onto heavy paper or cardboard. Cut out the pattern and crease it along the dashed lines. Then use glue or tape to assemble it. The figure is a model of a right square antiprism.

   **Check students’ work.**

2. How is the right square antiprism like a right square prism?
   - Name as many likenesses as you can.
   - **Answers may vary.** Each has two congruent, parallel square bases. In each, the segment whose endpoints are the centers of the bases is perpendicular to both bases. In each, all the diagonals are congruent to each other.

3. How is the right square antiprism different from a right square prism?
   - Name as many differences as you can.
   - **Answers may vary.**

4. On a separate sheet of paper, make a pattern for a right antiprism with two faces that are regular pentagons. Cut out and assemble the pattern. The figure is a right regular pentagonal antiprism.
   - Patterns may vary slightly.

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**Reading Strategies**

**Use a Concept Map**

Orthographic views show three-dimensional objects from six different perspectives. Use the concept map to help you visualize orthographic views.

1. What do the orthographic views of a three-dimensional object show?
   - They show the three-dimensional object from six different perspectives.

2. Draw the six orthographic views of the object shown at right and label each view. Assume there are no hidden cubes.
   - **Top**
   - **Front**
   - **Right**
   - **Bottom**
   - **Left**
   - **Back**