5.1 Views of Three-Dimensional Objects

Focus on...

After this lesson, you will be able to...

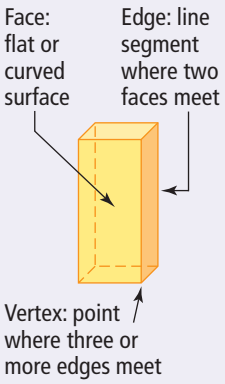
- draw and label top, front, and side views of 3-D objects
- build 3-D objects when given top, front, and side views

Materials

- 20 unit blocks
- masking tape
- isometric dot paper

Literacy Link

To describe a three-dimensional (3-D) object, count its *faces*, *edges*, and *vertices*.



Sable and Josh are trying to build exactly the same three-dimensional (3-D) object. They each have the same number of blocks, but they cannot see each other's object.

Using a common vocabulary can help Sable and Josh build the same object.

Explore the Math

How can you describe and build three-dimensional objects?

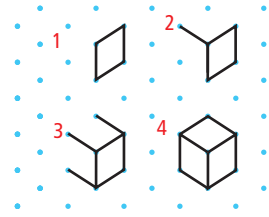
1. Work with a partner. Create a 3-D object using ten unit blocks. Make sure your partner cannot see your object.

2. Describe your completed object to your partner, and have your partner try to build the same object. What key words did you use that were helpful?

3. Decide which faces will be the front and top of your object. Then determine which faces are the bottom, left side, right side, and back. You may wish to label the faces with tape. Then, describe your object to your partner again. Was it easier to describe this time?

4. Using isometric dot paper, draw what your object looks like.

Using isometric dot paper makes it easier to draw 3-D shapes. Follow the steps to draw a rectangular solid.



Reflect on Your Findings

5. a) Do you need to know all the views to construct an object? If not, which ones would you use and why?

b) Explain why you might need to have only one side view, if the top and front views are also given.

c) Are any other views unnecessary? Are they needed to construct the same object?

Each view shows two dimensions. When combined, these views create a 3-D diagram.

Example 1: Draw and Label Top, Front, and Side Views

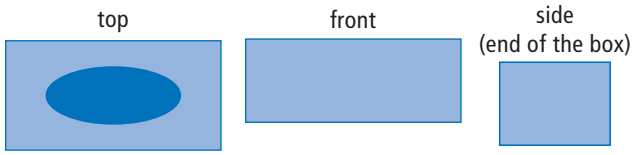
Using blank paper, draw the top, front, and side views of these items. Label each view.

a) Tissue box

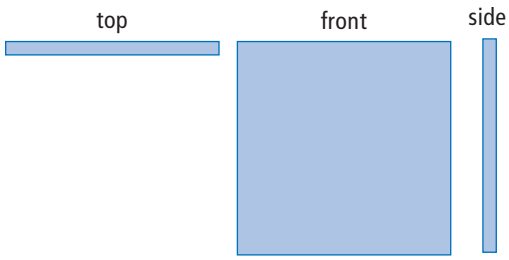
b) Compact disk case

Solution

a)

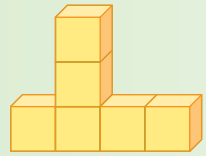


b)



Show You Know

Using blank paper, draw the top, front, and side views of this object.

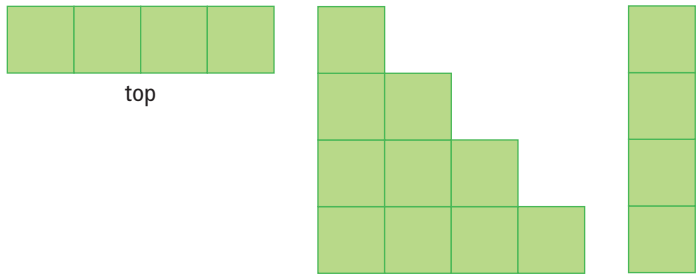


Example 2: Sketch a Three-Dimensional Object When Given Views

Did You Know?

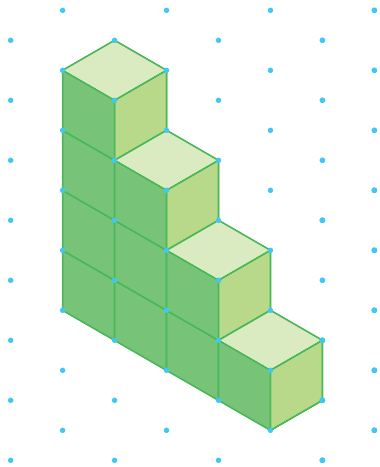
Architects use top views to draw blueprints for buildings.

These views were drawn for an object made of ten blocks. Sketch what the object looks like.



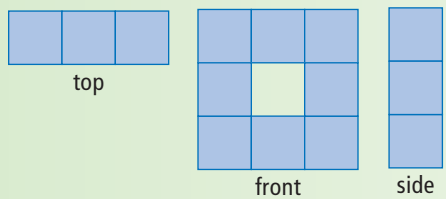
Solution

Use isometric dot paper to sketch the object.



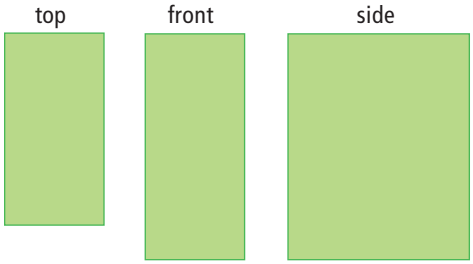
Show You Know

An object is created using eight blocks. It has the following top, front, and side views. Sketch what the object looks like on isometric dot paper.

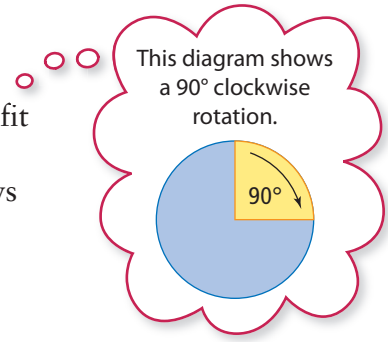


Example 3: Predict and Draw the Top, Front, and Side Views After a Rotation

The diagrams show the top, front, and side views of the computer tower.

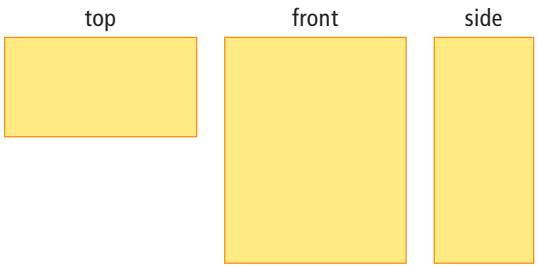


You want to rotate the computer tower 90° clockwise on its base to fit into your new desk. Predict which view you believe will become the front view after the rotation. Then, draw the top, front, and side views after rotating the tower.



Solution

The original side view will become the new front view after the rotation.



Tech Link

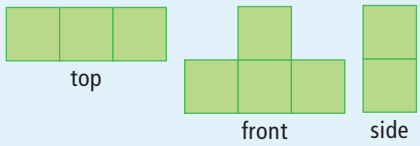
You can use a Draw program to create 3-D objects.

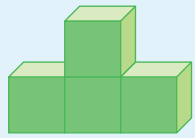
Show You Know

Stand your *MathLinks 8* student resource on your desk. Predict what the top, front, and side views will look like if you rotate it 90° clockwise about its spine. Then, draw the top, front, and side views after rotating the book.

Key Ideas

- A minimum of three views are needed to describe a 3-D object.
- Using the top, front, and side views, you can build or draw a 3-D object.

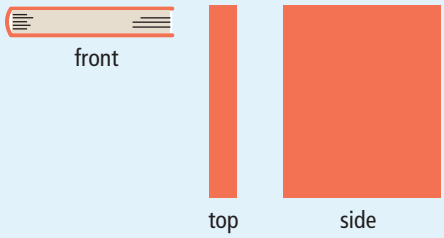


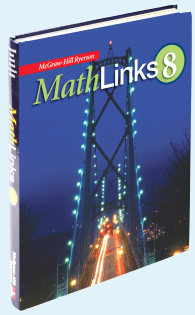


Communicate the Ideas

1. Raina insists that you need to tell her all six views so she can draw your object. Is she correct? Explain why or why not.

2. Are these views correct? Justify your answer.





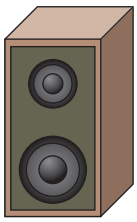
Check Your Understanding

Practise

For help with #3 and #4, refer to Example 1 on pages 165–166.

3. Sketch and label the top, front, and side views.

a)



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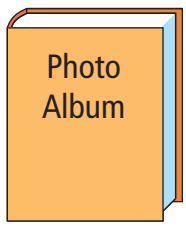
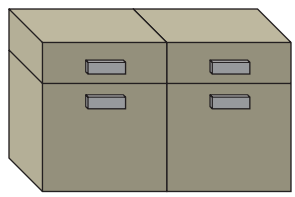
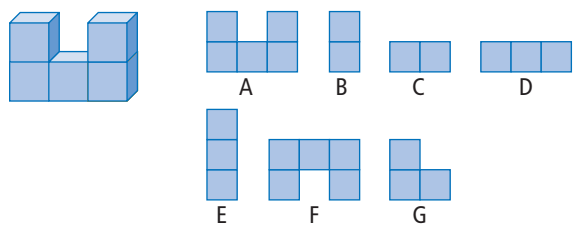


c)



4. Choose the correct top, front, and side view for this object and label each one.

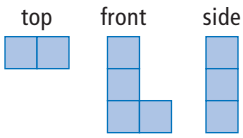


For help with #5, refer to Example 2 on page 166.

5. Draw each 3-D object using the views below.

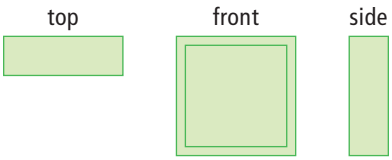
a)

b)



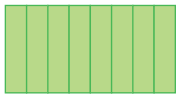
For help with #6 and #7, refer to Example 3 on page 167.

6. A television set has the following views.

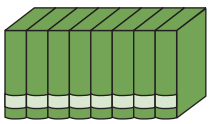


If you turn the television 90° counterclockwise, how would the three views change? Sketch and label each new view.

7. Choose which object has a front view like this after a rotation of 90° clockwise onto its side.

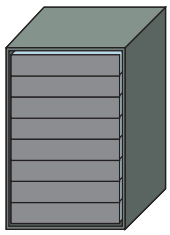


a)



set of books

b)



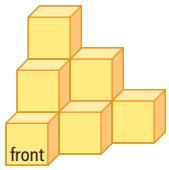
CD rack

Apply

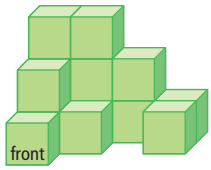
8. Choose two 3-D objects from your classroom. Sketch the top, front, and side views for each one.

9. Sketch the front, top, and right side views for these solids.

a)



b)



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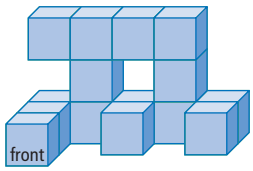

Extend

10. Describe two objects that meet this requirement: When you rotate an object 90°, the top, front, and side views are the same as the top, front, and side views of the object before it was rotated.

11. An injured bumblebee sits at a vertex of a cube with edge length 1 m. The bee moves along the edges of the cube and comes back to the original vertex without visiting any other vertex twice.

a) Draw diagrams to show the bumblebee's trip around the cube.

b) What is the length, in metres, of the longest trip?

MATH LINK

Choose one of the essential buildings that you discussed for your new community on page 163. Draw and label a front, side, and top view.