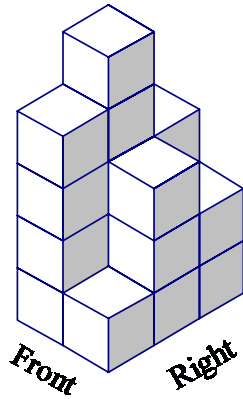


BUILDING PERSPECTIVES

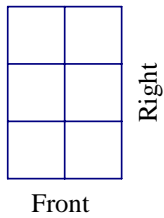
In this section, we will analyze solids made up of stacked cubes, which we will call buildings. Our analysis will involve looking at each building from various perspectives: the top, front, back, right and left views.

A three-dimensional portrayal of a building is shown below.

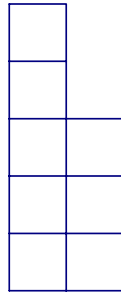


Below are perspectives taken from various sides of the above building (front, back, right, and left) as well as a top view from above the building.

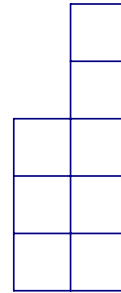
Top View:



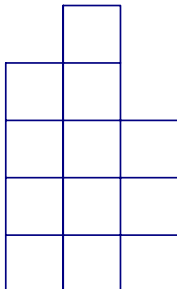
Front View:



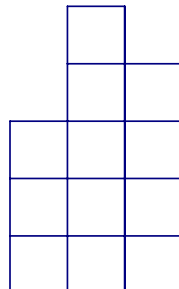
Back View:



Right View:



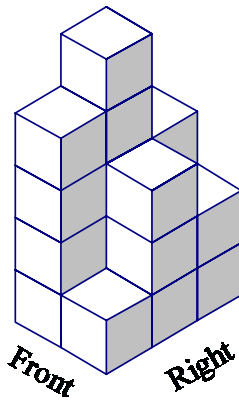
Left View:



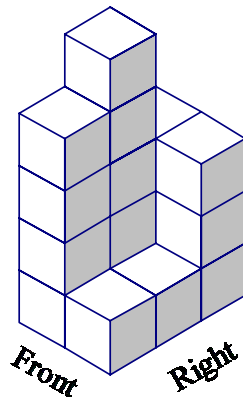
Notice that the front and back views are mirror images of each other, as are the right and left views. (For this reason, often only the top, front and right views are shown.)

Since the views are strictly two-dimensional, they are somewhat limiting in the information that they provide. The views provide information about the highest number of cubes in any individual column, but may ‘hide’ information about shorter stacks of blocks.

If we are asked, for example, to construct a building based on its five views, the solution is not necessarily unique. Below is the building from the example above, along with another building that has the same five views. (There are many other solutions as well.)



Initial Building



Another Building with the Same Five Views

There is another way of representing the building which is easier to draw than the three-dimensional diagram. It is a view from the top, with the number of cubes in each vertical stack listed at the top of that stack.

The two buildings above can be represented as follows:

Top View

3	2	Right
5	3	
4	1	

Front

Top View

3	3	Right
5	1	
4	1	

Front

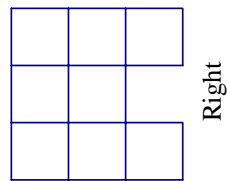
There are some cases in which a building is unique to its five views, as shown in the example below.

Example

Given views of a building from the five different perspectives illustrated below,

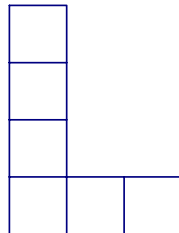
1. Construct the building, using the following methods:
 - a. Use one-inch cubes (or some other type of cubes), if available, to actually construct the building.
 - b. Use isometric dot paper, if available, to draw the building.
 - c. Draw the top view of the building, listing the number of cubes in each stack.
2. How many cubes are needed to construct this building?

Top View:

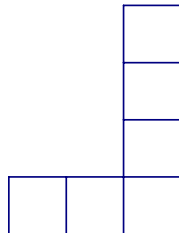


Front

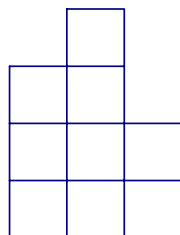
Front View:



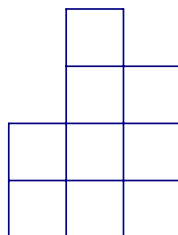
Back View:



Right View:



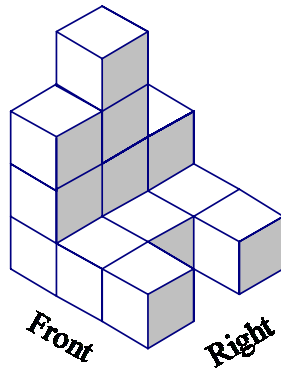
Left View:



The solution can be found on the next page...

Solution:

1. There is only one building made of cubes which fits all of the perspectives listed above. The building is shown below in both a three dimensional perspective, as well as the perspective from the top with the number of cubes in each stack.



Top View

2	1	1
4	1	
3	1	1

Front

Right

2. The building is made up of 14 cubes.

Exercises

1. Create a building using at least 12 cubes. (Use one-inch cubes, if available, to physically create the building.) Draw a top view which lists the number of cubes in each stack, and then draw views from the front, back, right, and left. Use isometric dot paper, if available, to draw a three-dimensional view of the building.
2. Draw the front, back, right and left views for the building represented by the following top view:

2	3	1
3	5	
4	2	1
6		2

Front

Right