



## Activity 1

### Materials for Building: Student Page

One aspect of architecture and construction is determining how much building material you need. Calculating the amounts of the various materials involves using a lot of mathematics.

#### Pouring a foundation

1. When you buy concrete, it comes in a unit called a cubic yard. A cubic yard of concrete is enough concrete to fill a cube that is 3 feet on each side. How many cubic feet of concrete are in a cubic yard? (See illustration below).



(Each Side = 3 Feet)

2. When you build a building, you have to pour a foundation for the walls to sit on. Suppose you want to pour a foundation for a playhouse with an outside dimension of 5 feet by 3 feet and a foundation that is 1 foot wide and 1 foot deep. How many cubic feet of concrete will you need?
3. Now, suppose you want to pour a foundation for a rectangular building with an outside dimension of 20 feet by 40 feet and a foundation that is 1 foot wide and 1 foot deep. How many cubic feet of concrete will you need?
4. How many cubic yards of concrete will you need?
5. When you pour the foundation, it leaves an open rectangle on the inside. What are the dimensions of this rectangle?
6. In addition to pouring the concrete for the walls of this foundation, the foundation you want requires you to pour enough concrete inside the walls to make a floor 6 inches thick. How many cubic feet of concrete do you need?

7. How many cubic yards of concrete will you need make the floor?

### **Building a floor**

One way to build a floor (that is not sitting on the ground) is to use joists. These are boards that lay on their sides under the floor and run in the same direction (parallel) to one of the sides. The rule when building floors is that you need a joist to start and another joist every 16 inches in a building, and if this does not come out even, you need to add an extra joist. The building you are working on is 20 feet by 40 feet.

8. Suppose you want to have a joist run the same direction as the 20-foot side. This means you will need one joist to start and joists every 16 inches along the side that is 40 feet. How many joists would you need?

9. If we laid these joists end to end, how long would they be?

10. Suppose we wanted to run the joists the same direction as the 40-foot side. How many joists would we need?

11. If we laid these joists end to end, how long would they be?