

Figure 3

**Volume of Section 2:**

$$30 \text{ ft} \times 10 \text{ ft} = 300 \text{ sq ft}$$

$$300 \text{ sq ft} \times 6 \text{ ft} = 1,800 \text{ cu ft}$$

**Volume of Section 3:**

$$40 \text{ ft} \times 30 \text{ ft} = 1,200 \text{ sq ft}$$

$$1,200 \text{ sq ft} \times 3 \text{ ft (1/2 of loft height)} = 3,600 \text{ cu ft}$$

**Volume of Section 4:**

$$30 \text{ ft} \times 10 \text{ ft} = 300 \text{ sq ft}$$

$$300 \text{ sq ft} \times 1 \text{ ft (1/2 of loft height)} = 300 \text{ cu ft}$$

**Volume of Section 5:**

$$40 \text{ ft} \times 30 \text{ ft} = 1,200 \text{ sq ft}$$

$$30 \text{ ft} \times 10 \text{ ft} = 300 \text{ sq ft}$$

$$1,200 \text{ sq ft} + 300 \text{ sq ft} = 1,500 \text{ sq ft}$$

$$1,500 \text{ sq ft} \times 2 \text{ ft (height of subarea)} = 3,000 \text{ cu ft}$$

Total volume would be the sum of all area volumes:

$$\begin{array}{r}
 9,600 \\
 1,800 \\
 3,600 \\
 300 \\
 \underline{3,000} \\
 \text{Total square feet} = 18,300
 \end{array}$$

## Calculating Average Height

Calculating the average height of a building is a critical step in figuring volume. Several methods are available. To figure the average height of a building with a gable roof, multiply one-half the distance from the ground-floor ceiling to the peak of the roof by the number of square feet in the loft. Another method is to multiply the maximum height at the peak by the number of square feet and divide the result by two.

If the building has a simple roof, without dormer or extra gables, as in Figure 4, you can calculate the average height of the total building by adding the wall height and one-half of the loft height.

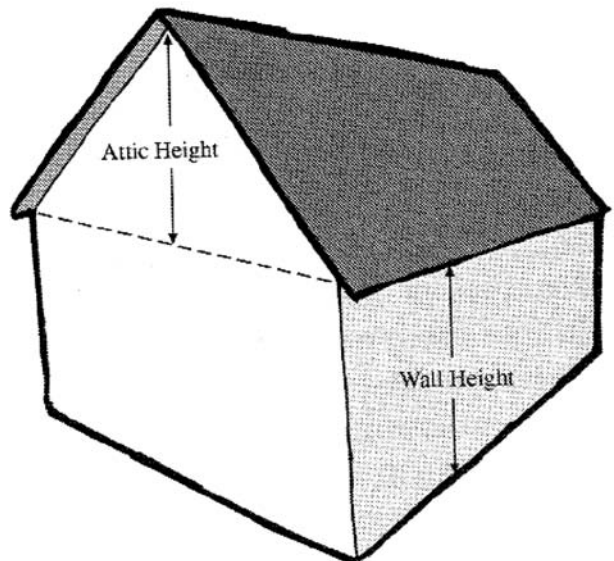


Figure 4

To measure the average height of the building in Figure 5, find the midway point between roof peak and eave. From there, measure to the ground. If the terrain is sloping or access to the outside is difficult, it is useful to measure the roof from inside while making the inspection.

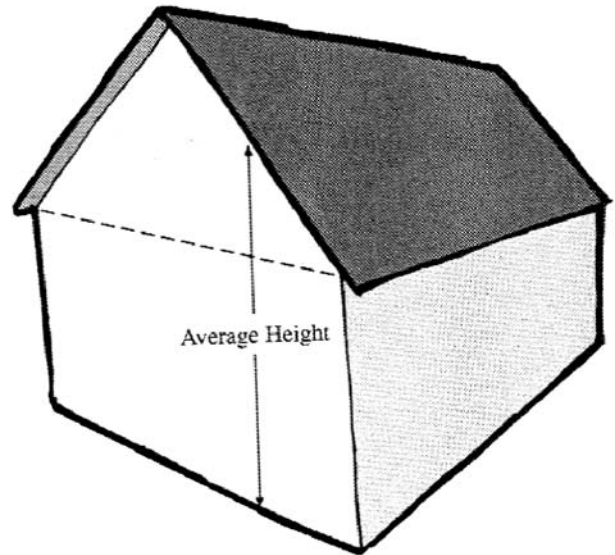


Figure 5

## Calculating the Volume of Grain Bins

Grain bins are usually cylindrical, with cone-shaped caps. To calculate the volume (cubic content) of a grain bin, you must know how to figure the volume of a cylinder and a cone:

$$\text{Volume of a cylinder} = 3.14 \times r^2 \times h$$

$$\text{Volume of a cone} = \frac{3.14 \times r^2 \times h}{3}$$

r = radius (1/2 of the diameter of the circular base of the bin)

h = height of the cylindrical part of the bin

3.14 is a constant often called "pi" and represented as  $\pi$

**Example 1:** Figure 6 shows a basic grain bin. The height of the cylindrical part of the bin is 25 feet. The diameter of the circular base of the bin is 20 feet. The height of the cone-shaped cap is 5 feet. With these dimensions, calculate the total volume (cubic content) inside the bin.

$$\begin{aligned} \text{Volume of the cylindrical portion} \\ \text{of the bin} &= 3.14 \times (10 \text{ feet})^2 \times 25 \text{ feet} \\ &= 7,850 \text{ cubic feet} \end{aligned}$$

$$\begin{aligned} \text{Volume of the cone-shaped cap} &= 3.14 \times (10 \text{ ft})^2 \times 5 \text{ feet} \\ &= \frac{1,570 \text{ cubic feet}}{3} \end{aligned}$$

Total volume

$$\begin{aligned} &523.3 \text{ cubic feet} \\ &7,850.0 \text{ cubic feet} \\ + &\underline{523.3 \text{ cubic feet}} \\ &8,373.3 \text{ cubic feet} \end{aligned}$$

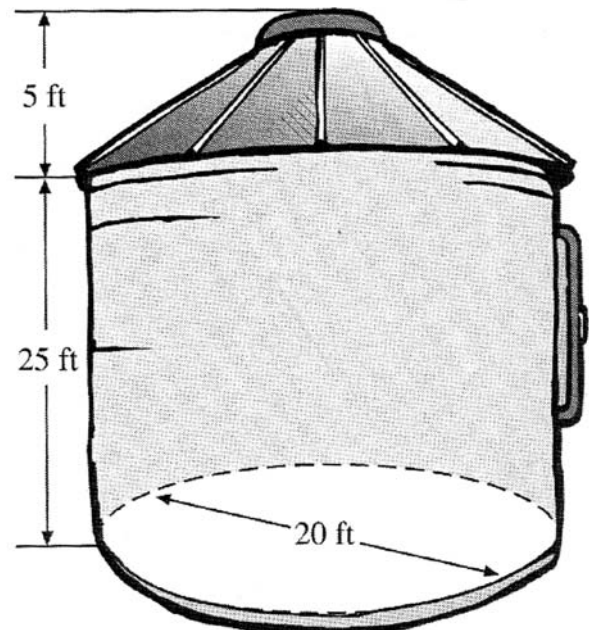


Figure 6