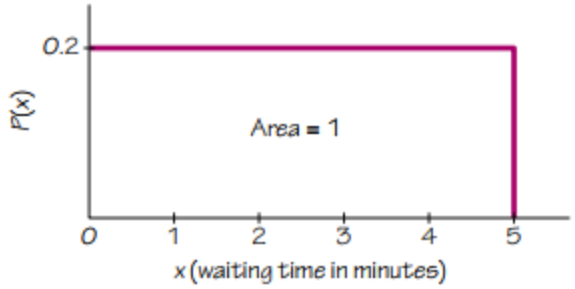

Figure 6-2 Uniform Distribution of Waiting Time

Requirements for a Density Curve

1. The total area under the curve must equal 1.
2. Every point on the curve must have a vertical height that is 0 or greater. (That is, the curve cannot fall below the *x*-axis.)

By setting the height of the rectangle in Figure 6-2 to be 0.2, we force the enclosed area to be $0.2 \times 5 = 1$, as required. (In general, the area of the rectangle becomes 1 when we make its height equal to the value of 1/range.) The requirement that the area must equal 1 simplifies probability problems, so the following statement is important:

Because the total area under the density curve is equal to 1, there is a correspondence between *area* and *probability*.

Example 2 Subway Waiting Time

Given the uniform distribution illustrated in Figure 6-2, find the probability that a randomly selected passenger has a waiting time greater than 2 minutes.

Solution

The shaded area in Figure 6-3 represents waiting times greater than 2 minutes. Because the total area under the density curve is equal to 1, there is a correspondence between area and probability. We can find the desired probability by using areas as follows:

$$\begin{aligned} P(\text{wait time greater than 2 min}) &= \text{area of shaded region in Figure 6-3} \\ &= 0.2 \times 3 \\ &= 0.6 \end{aligned}$$

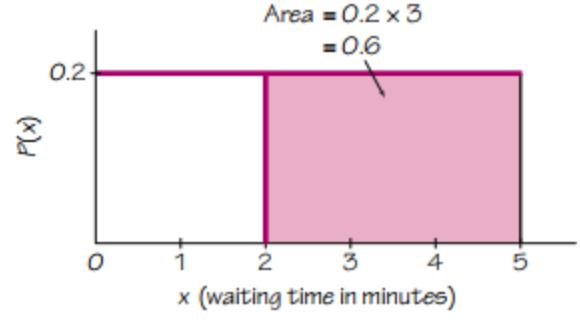

Figure 6-3 Using Area to Find Probability