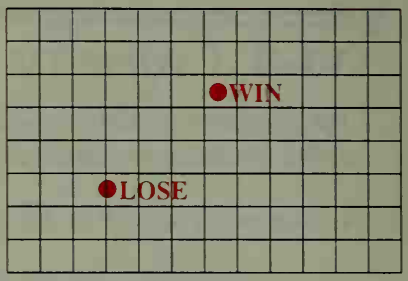
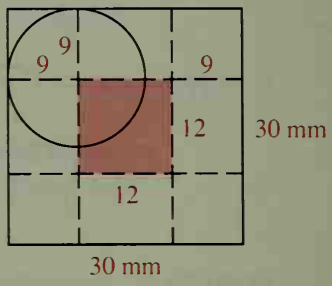
Example 3 At a carnival game, you can toss a coin on a large table that has been divided into squares 30 mm on a side. If the coin comes to rest without touching any line, you win. Otherwise you lose your coin. What are your chances of winning on one toss of a dime? (A dime has a radius of 9 mm.)



Solution Although there are many squares on the board, it is only necessary to consider the square in which the center of the dime lands. In order for the dime to avoid touching a line, the dime's center must be more than 9 mm from each side of the square. Its center must land in the shaded square shown. Thus the probability that the dime does not touch a line is equal to the probability that the center of the dime lies in the shaded region.

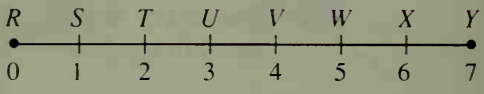


$$\text{probability of winning} = \frac{\text{area of shaded square}}{\text{area of larger square}} = \frac{12^2}{30^2} = 0.16$$

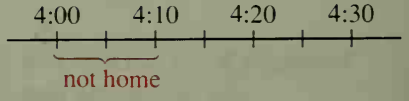
Note: In practice, your probability of winning would be less than 16% for several reasons. For example, a carnival might require you to toss a quarter instead of the smaller dime, as discussed in Written Exercise 9.

Classroom Exercises

1. A point P is picked at random on $\overline{RW}$. What is the probability that P is on:
   a. $\overline{RS}$? b. $\overline{SV}$? c. $\overline{SW}$?
   d. $\overline{RW}$? e. $\overline{XY}$? f. $\overline{RY}$?



2. A friend promises to call you sometime between 4:00 and 4:30 P.M. If you are not home to receive the call until 4:10, what is the probability that you miss the first call that your friend makes to you?



3. A dart lands at a random point on the square dartboard shown. What is the probability that the dart is within the outer circle? within the bull's eye? Use $\pi \approx 3.14$.

4. A ship is known to have sunk in the ocean in a square region 100 mi on a side. A salvage vessel anchors at a random spot in this square. Divers search 1 mi in all directions from the point on the ocean floor directly below the vessel. What is the approximate probability that they locate the sunken ship on the first try? Use $\pi \approx 3.14$.