

THEORETICAL PROBABILITY The outcomes for a specified event are called *favorable outcomes*. When all outcomes are equally likely, the **theoretical probability** of the event can be found using the following:

$$\text{Theoretical probability} = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$$

The probability of event A is written as $P(A)$.

EXAMPLE 2 Find a theoretical probability

T-SHIRTS You and your friends designed T-shirts with silk screened emblems, and you are selling the T-shirts to raise money. The table below shows the number of T-shirts you have in each design. A student chooses a T-shirt at random. What is the probability that the student chooses a red T-shirt?

	Gold emblem	Silver emblem
Green T-shirt	10	8
Red T-shirt	6	6



Solution

You and your friends have a total of $10 + 6 + 8 + 6 = 30$ T-shirts. So, there are 30 possible outcomes. Of all the T-shirts, 12 T-shirts are red. There are 12 favorable outcomes.

$$\begin{aligned} P(\text{red T-shirt}) &= \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}} \\ &= \frac{\text{Number of red T-shirts}}{\text{Total number of T-shirts}} \\ &= \frac{12}{30} \\ &= \frac{2}{5} \end{aligned}$$



GUIDED PRACTICE for Example 2

- T-SHIRTS** In Example 2, what is the probability that the student chooses a T-shirt with a gold emblem?
- You toss a coin and roll a number cube. What is the probability that the coin shows tails and the number cube shows 4?

EXPERIMENTAL PROBABILITY An **experimental probability** is based on repeated *trials* of an experiment. The number of trials is the number of times the experiment is performed. Each trial in which a favorable outcome occurs is called a *success*.

$$\text{Experimental probability} = \frac{\text{Number of successes}}{\text{Number of trials}}$$