13-3

Study Guide

Probability and Odds

The **probability** of an event is the ratio of the number of ways an event can happen to the total number of ways an event can and cannot happen.

Example **A bag contains 3 black, 5 green, and 4 yellow marbles.**

a. What is the probability that a marble selected at random will be green?

The probability of selecting a green marble is written P(green). There are 5 ways to select a green marble from the bag and 3 + 4, or 7, ways not to select a green marble. So, success (s) = 5 and failure (f) = 7. Use the probability formula.

$P(\text{green}) = \frac{5}{5+7}$ or $\frac{5}{12}$ $\qquad P(s) = \frac{s}{s+f}$

The probability of selecting a green marble is $\frac{5}{12}$.

b. What is the probability that a marble selected at random will *not* be yellow?

There are 8 ways not to select a yellow marble and 4 ways to select a yellow marble.

$P(\text{not yellow}) = \frac{8}{4+8}$ or $\frac{2}{3}$ $\qquad P(f) = \frac{f}{s+f}$

The probability of not selecting a yellow marble is $\frac{2}{3}$.

c. What is the probability that 2 marbles selected at random will both be black?

Use counting methods to determine the probability. There are $C(3, 2)$ ways to select 2 black marbles out of 3, and $C(12, 2)$ ways to select 2 marbles out of 12.

$$P(\text{2 black marbles}) = \frac{C(3, 2)}{C(12, 2)}$$

$$= \frac{\frac{3!}{1!2!}}{\frac{12!}{10!2!}} \text{ or } \frac{1}{22}$$

The probability of selecting 2 black marbles is $\frac{1}{22}$.