10.5 Independent and Dependent Events

independent events – the occurrence of one event **does not** affect the likelihood that the other event(s) will occur

Key Idea

Probability of Independent Events

Words The probability of two or more independent events is the product of the probabilities of the events.

Symbols $P(A \text{ and } B) = P(A) \cdot P(B)$

$$P(A \text{ and } B \text{ and } C) = P(A) \cdot P(B) \cdot P(C)$$

dependent events – the occurrence of one event **does** affect the likelihood that the other event(s) will occur

Key Idea

Probability of Dependent Events

Words The probability of two dependent events A and B is the probability of A times the probability of B after A occurs.

Symbols $P(A \text{ and } B) = P(A) \cdot P(B \text{ after } A)$

Ex 1: You randomly choose a marble from a bag of 5 blue, 3 green, and 4 red. 12 total
Without replacing the first marble, you choose a second marble.

(a) Find the probability of choosing 2 reds.

$P(\text{red, red}) = \left(\frac{4}{12}\right)\left(\frac{3}{11}\right)$

$= \boxed{\frac{1}{11}}$

dependent

(b) Find the probability of choosing a green then a blue.

$P(\text{green, then blue}) = \left(\frac{3}{12}\right)\left(\frac{5}{11}\right)$

$= \boxed{\frac{5}{44}}$

dependent

Ex 2: A cooler contains 5 grape juice bottles and 11 cranberry juice bottles. You randomly choose two bottles. What is the probability that both bottles are cranberry juice?

$P(\text{cranberry, cranberry}) = \left(\frac{11}{16}\right)\left(\frac{10}{15}\right)$

$= \boxed{\frac{11}{24}}$

dependent

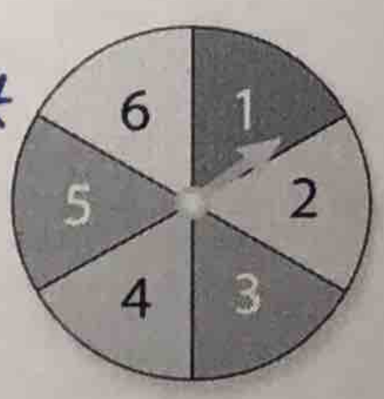
Ex 3: You spin the spinner twice. Find the probability of the event.

(a) Spinning a 1 then a 5

$P(1,5) = \left(\frac{1}{6}\right)\left(\frac{1}{6}\right)$

$= \boxed{\frac{1}{36}}$

independent



(b) Spinning a 3 then a number greater than 3

$P(3, \#>3) = \left(\frac{1}{6}\right)\left(\frac{3}{6}\right)$

$= \boxed{\frac{1}{12}}$

(c) Spinning an odd number then an even number.

$P(\text{odd, even}) = \left(\frac{3}{6}\right)\left(\frac{3}{6}\right)$

$= \boxed{\frac{1}{4}}$