Probability

Independent vs. Dependent events

ESSENTIAL QUESTION: What connection does conditional probability have to independence?
Standards: MCC9-12.S.CP.1-7

Independent Events

- Two events A and B, are **independent** if the fact that A occurs does not affect the probability of B occurring.
- Examples:
  - Landing on heads from two different coins
  - rolling a 4 on a die, then rolling a 3 on a second roll of the die.
- Probability of A and B occurring:

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

"and" means multiply

Experiment 1

- **A coin is tossed and a 6-sided die is rolled. Find the probability of landing on the head side of the coin and rolling a 3 on the die.**

P(head)= $\frac{1}{2}$

P(3)= $\frac{1}{6}$

P(head and 3)=P(head) • P(3)

$= \frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

Experiment 2

- **A card is chosen at random from a deck of 52 cards. It is then replaced and a second card is chosen. What is the probability of choosing a jack and an eight?**

$P(J) = \frac{4}{52}$ or $\frac{1}{13}$

$P(8) = \frac{4}{52}$ or $\frac{1}{13}$

$P(J \text{ and } 8) = \frac{1}{13} \cdot \frac{1}{13} = \frac{1}{169}$

Experiment 3

16 total

- A jar contains three red, five green, two blue and six yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a green and a yellow marble?

$P(\text{green}) = \frac{5}{16}$

$P(\text{yellow}) = \frac{6}{16}$

$P(\text{green and yellow}) = \frac{5}{16} \cdot \frac{6}{16} = \frac{30}{256}$

$\frac{15}{128}$