Probability – Multiplication Rule (and)

Independent Event

Two events are independent if they do not affect one another

$Pr(6) = \frac{1}{6}$ ✓

Eg: Rolling a '6' and then roll '3' in a dice

$Pr(3) = \frac{1}{6}$ ✓

These events are independent because rolling a '6' does not change the probability of rolling a '3'

Dependent Event

They affect one another

Eg: Bag of marbles

4 red 2 black

3 red 2 black

→ $Pr(\text{Red}) = \frac{4}{6} = 2/3$

↳ $Pr(B) = \frac{2}{5}$

Eg: Multiplication Rule for Independent Events.

What is the probability of rolling 6 and then a 3. with a normal 6 sided dice?

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

$P(6 \text{ and } 3) = P(6) * P(3)$

$= \frac{1}{6} * \frac{1}{6} = \frac{1}{36}$

Eg: Multiplicotion Rule for dependent Events

What is the probability of drawing a "Queen" and then drawing a "King" from a deck of cards?

Ans)

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

$$P(Q \text{ and } K) = P(Q) * P(K/Q)$$

$$P(Q) = \frac{4}{52}$$

$$P(K/Q) = \frac{4}{51}$$

↳ 51

$$= \frac{4}{52} * \frac{4}{51} = .006 = 0.6\%$$