10.5: Probability of Independent and Dependent Events

replacement

Independent events have no effect on the occurrence of each other.

$$P(AandB) = P(A) \bullet P(B)$$

For a fundraiser, a class sells 150 raffle tickets for a mall gift certificate and 200 raffle tickets for a booklet of movie passes. You buy 5 raffle tickets for each prize. What is the probability that you win both prizes?

(A) $\frac{1}{6000}$ (B) $\frac{1}{1200}$ (C) $\frac{1}{350}$ (D) $\frac{1}{70}$

$\frac{1}{\cancel{5}_{1}{150}} \cdot \frac{1}{\cancel{5}_{\cancel{200}\ \cancel{40}\ 8}} = \frac{1}{1200}$

In a BMX meet, each heat consists of 8 competitors who are randomly assigned lanes from 1 to 8. What is the probability that a racer will draw lane 8 in the 3 heats in which the racer participates?

$P(H1) \cdot P(H2) \cdot P(H3)$

$\frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{8}$

$\frac{1}{512}$

While you are riding to school, your portable CD player randomly plays 4 different songs from a CD with 16 songs on it. What is the probability that you will hear your favorite song on the CD at least once during the week $(5$ days$)$?

$P(\text{not hearing}) = \frac{{}_{15}C_4}{{}_{16}C_4} = \frac{3}{4}$

$1 - \left(\frac{3}{4}\right)^5 \approx .763$

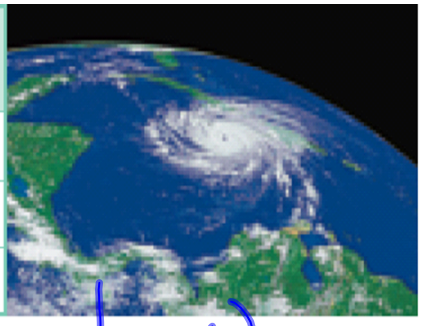
Dependent Events are events where the occurrence of one effects the occurrence of the others. not replaced

$$P(AandB) = P(A) \bullet P(B|A)$$

The probability that B will occur given that A has already occurred is Conditional probability

The table shows the numbers of tropical cyclones that formed during the hurricane seasons from 1988 to 2004. Use the table to estimate (a) the probability that a future tropical cyclone is a hurricane and (b) the probability that a future tropical cyclone in the Northern Hemisphere is a hurricane.

Type of Tropical Cyclone	Northern Hemisphere	Southern Hemisphere
Tropical depression	199	18
Tropical storm	398	200
Hurricane	545	215



a) P(Hurr.) $\frac{760}{1573}$

b) P(Hurr. | North) $\frac{545}{1142}$

You randomly select two cards from a standard deck of 52 cards. What is the probability that the first card is not a heart and the second is a heart if (a) you replace the first card before selecting the second, and (b) you do *not* replace the first card?

a) P(not heart & heart)

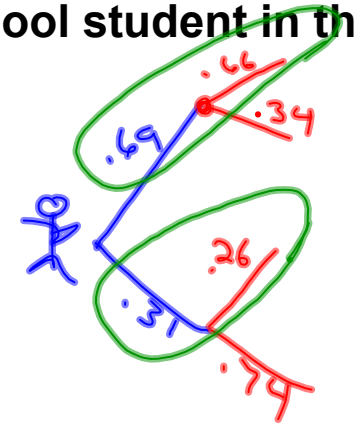
$\frac{39}{52} \cdot \frac{13}{52} = \frac{3}{16}$

b) P(not heart and heart) not replaced

$\frac{39}{52} \cdot \frac{13}{51} = \frac{13}{68}$

You and two friends go to the same store at different times to buy costumes for a costume party. There are 15 different costumes at the store, and the store has at least 3 duplicates of each costume. What is the probability that you each choose different costumes?

Using observations made of drivers arriving at a certain high school, a study reports that 69% of adults wear seat belts while driving. A high school student also in the car wears a seat belt 66% of the time when the adult wears a seat belt, and 26% of the time when the adult does not wear a seat belt. What is the probability that a high school student in the study wears a seat belt?



$.69(.66) + (.31)(.26)$

$.536$

Work: Chapter 10.5 pg.721
#'s 4,8,10-16e,20-30e