Unit 5: Probability 5.3 Conditional Probability Notes

Name: _____ Date: _____ Period: _____

Conditional Probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

- The probability of event **A** happening, given that another event, **B**, has already occurred.
  - Probability of both over the probability of the 2nd event
- If two events are independent then neither the probability of A nor B is affected by the occurrence of the other event.
  - $P(A|B)$ = P(A)
  - $P(B|A)$ = P(B)
  - The answer is always the 1st event

Ex1: In New York State, 48% of all teenagers own a skateboard and 39% of all teenagers own a skateboard and roller blades. What is the probability that a teenager owns roller blades given that the teenager owns a skateboard?

$P(RB|S) = \frac{P(RB \cap S)}{P(S)} \quad \frac{.39}{.48} = 0.81$

Ex2: 500 women were surveyed. 323 of them had long hair and 177 of them had short hair. 120 of the long hair women had brown hair and 55 of the short hair women had brown hair. What is the probability of a women having brown hair given that they have short hair?

$P(BH|SH) = \frac{P(BH \cap SH)}{P(SH)} = \frac{55}{177} = 0.31$

Ex3: 200 men and 150 women were surveyed. 120 men and 78 women claim to watch ESPN Sports Center. What is the probability that a person watches Sports Center given that they are a woman?

$P(SC|W) = \frac{P(SC \cap W)}{P(W)} = \frac{78}{150} = 0.52$ or $13/25$

Ex4: If the events spinning a spinner and picking a card are independent then the probability of $P(spinning\ a\ spinner|picking\ a\ card)$ is equal to: spinning a spinner.

Ex5: The events having a dog and owning a house are independent then the probability: $P(owning\ a\ house|having\ a\ dog)\ is\ equal\ to:$ owning a house

Ex6: Given the following table, find the given probabilities.

	Play a Sport	Do Not Play a Sport	Total
Males	42	33	75
Females	12	23	35
Total	54	56	110

a. $P(Male|play\ a\ sport)$ b. $P(Male|Do\ not\ play\ a\ sport)$ c. $P(Female|play\ a\ sport)$

a. $\frac{P(M \cap S)}{P(S)} = \frac{42}{54} = \frac{7}{9}$

b. $\frac{P(M \cap NS)}{P(NS)} = \frac{33}{56}$

c. $\frac{P(F \cap S)}{P(S)} = \frac{12}{54} = \frac{2}{9}$