

Notes Conditional Probability and the Multiplication Rule

I. Conditional Probability

This is denoted by _____ and is read as _____.

Example 1: Use the table below to find the following probabilities:

	Rides bus	Drives	Other
Freshmen	25	0	17
Sophomores	19	2	12
Juniors	15	7	11
Seniors	12	13	9

- What is the probability of choosing a freshman?
- What is the probability of choosing a person that drives to school?
- What is the probability that a student drives to school, given they are a junior?
- What is the probability that a student is a freshmen, given they ride the bus to school?
- $P(\text{senior})$
- $P(\text{other}|\text{freshmen})$
- $P(\text{sophomore}|\text{drive})$

II. Independent Events

Events that are not independent are **dependent**.

Example 2:

Decide whether the events are independent or dependent.

- Practicing the piano (A) and then becoming a concert pianist (B).
- Tossing a coin and getting a tail (A), and then rolling a six-sided die and obtaining a 3 (B).
- A salmon swims successfully through a dam (A) & then swims successfully through a second dam (B).
- Exercising frequently (A) and having a low resting heart rate (B).
- Driving over 85 miles per hour (A), and then getting in a car accident (B).

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III. The Multiplication Rule for the Probability of A and B

If events A and B are dependent, then the rule for multiplication is _____.

If events A and B are independent, then the rule for multiplication is _____.

Example 3

- a. Two cards are selected without replacement from a standard deck of cards. Find the probability of selecting a king and then selecting a queen.
- b. A coin is tossed and a die is rolled. Find the probability of getting a tail and then rolling a 3.
- c. Suppose the probability of a salmon successfully swimming through a dam is 0.90.
 1. Find the probability that three salmon swim successfully through the dam.
 2. Find the probability that at least one salmon swims successfully through the dam.
- d. Two cards are selected without replacement from a standard deck of cards. Find the probability that they are both hearts.