

# Chapter 12

## Probability

12.1 Sample Spaces and Probability

12.2 Independent and Dependent Events

**12.3 Two-Way Tables and Probability**

12.4 Probability of Disjoint and Overlapping Events

12.5 Permutations and Combinations

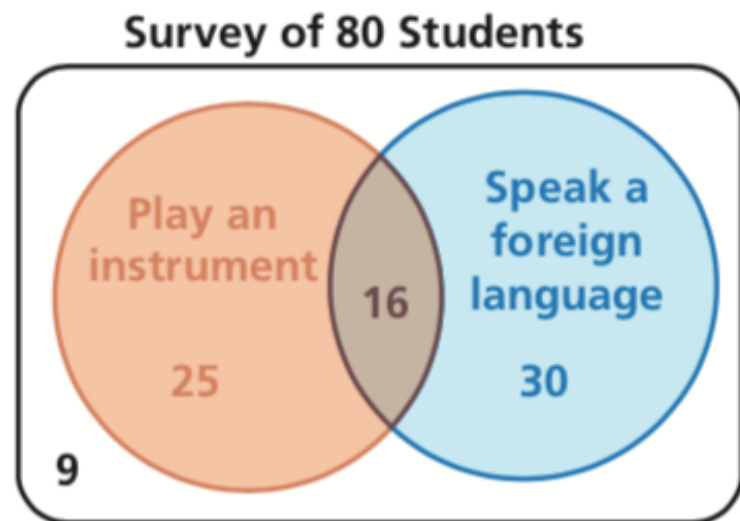
12.6 Binomial Distributions



# 12.3 Two-Way Tables and Probability

## Two-way Table

- The Venn diagram shows the results of a survey of 80 students. Using the information in the diagram, fill in the table below.
- Using the table, how many students speak a foreign language?
- How many do not play an instrument?



	Play an Instrument	Do Not Play an Instrument	Total
Speak a Foreign Language			
Do Not Speak a Foreign Language			
Total			

# 12.3 Two-Way Tables and Probability

## Vocabulary

- **Two-way table** - A frequency table that displays data collected from one source that belong to two different categories.
- **Joint frequency** - Each entry in the table.
- **Marginal frequency** - Sums of the rows and columns.

		Attendance		Total
		Attending	Not Attending	
Class	Junior	42	64	106
	Senior	77	37	114
Total		119	101	220

# 12.3 Two-Way Tables and Probability

## Vocabulary

- **Joint relative frequency** - The ratio of a joint frequency (one entry) to the total number.

$$\frac{42}{220} \approx 0.191$$

About 19.1% of the students attending are Juniors

		Attendance		Total
		Attending	Not Attending	
Class	Junior	42	64	106
	Senior	77	37	114
Total		119	101	220



# 12.3 Two-Way Tables and Probability

## Vocabulary

- **Joint relative frequency** - The ratio of a joint frequency (one entry) to the total number.
- **Marginal relative frequency** - The sum of the joint frequencies in a row or column.

$$\frac{42}{220} + \frac{64}{220} \approx 0.482$$

About 48.2% of the students surveyed were Juniors

		Attendance		Total
		Attending	Not Attending	
Class	Junior	$\frac{42}{220} \approx 0.191$	$\frac{64}{220} \approx 0.291$	0.482
	Senior	$\frac{77}{220} = 0.35$	$\frac{37}{220} \approx 0.168$	0.518
Total		0.541	0.459	1

# 12.3 Two-Way Tables and Probability

## Vocabulary

- **Conditional relative frequencies** - The ratio of the marginal frequency (one entry) over the total in each row or column.

		Attendance	
		Attending	Not Attending
Class	Junior	$\frac{0.191}{0.482} \approx 0.396$	$\frac{0.291}{0.482} \approx 0.604$
	Senior	$\frac{0.35}{0.518} \approx 0.676$	$\frac{0.168}{0.518} \approx 0.324$

		Attendance		Total
		Attending	Not Attending	
Class	Junior	$\frac{42}{220} \approx 0.191$	$\frac{64}{220} \approx 0.291$	0.482
	Senior	$\frac{77}{220} = 0.35$	$\frac{37}{220} \approx 0.168$	0.518
Total		0.541	0.459	1

Given that a student is a Junior, the conditional relative probability that he/she is not attending is about 60.4%.

# 12.3 Two-Way Tables and Probability

## Finding Conditional Probabilities

A satellite TV provider surveys customers in three cities. The survey asks whether they would recommend the TV provider to a friend. The results, given as joint relative frequencies, are shown in the two-way table.

		Location		
		Glendale	Santa Monica	Long Beach
Response	Yes	0.29	0.27	0.32
	No	0.05	0.03	0.04

- What is the probability that a randomly selected customer who is located in **Glendale** will **recommend** the provider?
- What is the probability that a randomly selected customer who will **not recommend** the provider is located in **Long Beach**?
- Determine whether recommending the provider to a friend and living in Long Beach are independent events?