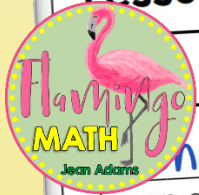


Algebra 2 Honors

Conditional Probability

Lesson 4: Conditional Probability

Vocabulary



Conditional Probability - a condition that may limit the sample space for an event. You can write a conditional probability using the notation $P(B|A)$, read "the probability of event B, given event A."

CONDITIONAL PROBABILITY FORMULA

For any two events A and B from a sample space with $P(A) \neq 0$,

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

for two events A and B
where $P(A) \neq 0$

Two-way Table

- A useful way to organize data that can be categorized by two variables.

	FICTION	NONFICTION
Paperback	24	56
Hardcover	82	38

Completely Editable

12.4

Lesson 12.4: Conditional Probability

Vocabulary

Conditional Event - a condition that may limit the sample space for an event. You can write a conditional probability using the notation $P(B|A)$, read "the probability of event B , given event A ."

CONDITIONAL PROBABILITY FORMULA

For any two events A and B from a sample space with $P(A) \neq 0$,

Contingency Table - A useful way to organize data that can be categorized by two variables.

	FICTION	NONFICTION
Paperback	24	56
Hardcover	82	38

Relative Frequency - The values in each category divided by the total number of values in a two-way table.

Joint Relative Frequency - The sum of all the joint relative frequencies in each row and column of a two-way table.

	FICTION	NONFICTION	TOTAL
Paperback	0.12	0.28	0.40
Hardcover	0.41	0.19	0.60
TOTAL	0.53	0.47	1

Finding Conditional Probability

EX #1: The results from a class survey are shown in the table below.

A. Find the probability $P(\text{own a pet} | \text{female})$

Do You Own a Pet?		
	YES	NO
MALE	8	5
FEMALE	6	7

B. Find the probability $P(\text{own a pet} | \text{male})$

C. Find the probability $P(\text{don't own a pet})$

EX #2: Use the table to find each probability.

Job Applicant Traits

		JOB EXPERIENCE	
		YES	NO
HIGH SCHOOL DIPLOMA	YES	62	23
	NO	7	4

A. $P(\text{diploma})$

B. $P(\text{diploma and experience})$

C. $P(\text{experience} | \text{diploma})$

D. $P(\text{no diploma} | \text{experience})$

Conditional Relative Frequency and Probability

EX #3: A reporter asked 150 voters how they plan to vote on a new sports stadium and a new performing arts center.

A. Complete the table of joint and relative frequency.

How Will You Vote?				Sports Stadium				
		Sports Stadium						
		YES	NO					
Performing Arts Center	YES	58	32	Performing Arts Center	YES			
	NO	23	37 <th>NO</th> <td></td> <td></td> <td></td>		NO			
				TOTAL				

B. If a voter plans to say no to the sports stadium, what is the probability the voter also plans to say no to the new performing arts center?

Real-World Connection

EX #4: Use the table below to find each probability.

Projected Number of Degree Recipients in 2015 (thousands)		
Degree	Male	Female
Associate's	272	472
Bachelor's	677	1028
Master's	293	464

SOURCE: U.S. National Center for Education Statistics

A. P (The recipient is male.)

B. P (The degree is a Bachelor's.)

C. P (The recipient is female, given that the degree is a Master's.)

D. P (The degree is *not* an Associate's, given that the recipient is male.)

A. Make a tree diagram. Use **S** for sunny, **C** for cloudy, **R** for rainy, and **N** for no rain.

B. Use the diagram to find the probability that a day will start out sunny, and then it will rain.

C. Find P (no rain, given a cloudy day)

One More Survey

EX #6: Myles took a survey of randomly selected students and summarized the results in the table below.

A. Make a table of the joint relative frequencies and marginal relative frequencies.

How Will You Vote?				MP3 PLAYER		
	MP3 PLAYER			YES	NO	TOTAL

NOTES

Name _____ Date _____

12.4

Conditional Probability Practice

Problems 1 – 6, the table at right contains information about the 1120 employees at a local business. Find each probability.

Employee Salary and Education

	Under \$30,000	\$30,000 to \$50,000	Over \$50,000
No diploma	77	48	3
High School	104	73	14
Some college	93	127	152
College degree	14	184	231

1. P (employee has no diploma)2. P (earns under \$30,000)3. P (earns under \$30,000 and has no diploma)4. P (earns under \$30,000 with a college degree)

5. Given that the employee has only a high school education, the probability that the employee earns over \$50,000.

6. Given that the employee earns over \$50,000, the probability that the employee has only a high school education or no diploma,

Problems 7 – 8, make a tree diagram based on the survey results to find each probability.**Survey Results About School Transportation**

- ☐ 23% males responded
- ☐ Of all female respondents, 43% drive to school
- ☐ Of all male respondents, 28% ride the bus

7. P (a female drives to school)8. P (is both male and

Problems 9 – 14, use the information from the data collected to find the relative frequency for each mode of transportation. The human resource department in a large city surveyed 130 employees about how they get to work each day. 68 used public transportation, 43 drive a car, 8 ride a bike, and 11 walk. Then, find the probabilities.

9. Public Transportation:

10. Car:

11. Bike:

12. Walking:

13. P (Public transportation or car)14. P (bike or walk)**Problems 15 – 20**, find each probability.

15. In a high school of 1400 students 385 are seniors, 270 students take Algebra 2, and 70 students are seniors also taking Algebra 2. What is the probability that a randomly chosen student who is a senior; is taking Algebra 2?

16. In a Midwest city, 46% of all teens own a bicycle and 37% of all teens own a bicycle and roller blades. What is the probability that a teen owns roller blades given that they own a bicycle?

17. At North Heights High School 39% of the students have a part-time job and 21% of the students who work at a job also maintains a B-average. What is the probability that a teen maintains a B-average given that they work a part-time job?

18. Use the table at right: P (The recipient is female.)

20. Use the table at right: P (the recipient is female, given that the degree is advanced.)

Practice Sets

Name _____

Date _____

Period _____

Lesson Warm-Ups

3. P (at least one green)4. P (neither spin blue)

Name _____ Date _____ Period _____

Lesson 12.4: Conditional Probability**Warm-Up #2**

A spinner has four equal sections that are green, blue, red, and yellow. Find each probability for two spins.

1. P (not blue, then not yellow)2. P (green, then green)3. P (not green, then blue)4. P (at least one red)**Form A**

Period _____

Failed Test	TOTAL
10	24
12	96
TOTAL	98

hours of sleep

TOTAL

98

22

120

1. What is the probability that a student who failed the exam got less than 6 hours sleep?

2. What is the probability that a student who got less than 6 hours of sleep failed the exam?

3. What is the probability that a student got less than 6 hours of sleep and failed the exam?

12.4 Conditional Probability**Form B**

Name _____

Date _____ Period _____

	Passed Test	Failed Test	TOTAL
Less than 6 hours of sleep	18	16	34
More than 6 hours of sleep	92	14	106
TOTAL	110	30	140

1. What is the probability that a student who failed the exam got less than 6 hours sleep?

2. What is the probability that a student who got less than 6 hours of sleep failed the exam?

3. What is the probability that a student got less than 6 hours of sleep and failed the exam?

Grade: _____

Grade: _____

Daily Lesson Quiz