

Geometry  
Conditional Probability

Name: \_\_\_\_\_  
Date: \_\_\_\_\_

What is conditional probability?

- a probability of one event happening given that another event
- has already happened. Also considered dependent probability.

Conditional Probability Formula:  $P(B|A) = \frac{P(B \cap A)}{P(A)}$

"The probability of event B, given event A"

Examples:

1. The table shows the results of a class survey: "do you own a pet?"  
Find  $P(\text{own a pet} | \text{female})$ .

$$\frac{8}{14} = \frac{4}{7}$$

	Yes	No
Female	8	6
Male	5	7

2. The table shows the results of a class survey: "did you wash the dishes last night?"  
Find  $P(\text{wash the dishes} | \text{male})$ .

$$\frac{7}{15}$$

	Yes	No
Female	7	6
Male	7	8

3. Using the data in the table, find the probability that a sample of not recycled waste as plastic.  
 $P(\text{plastic} | \text{not recycled})$ .

$$\frac{20.4}{156.3} \approx .13$$

	Recycled	Not Recycled
Paper	34.9	48.9
Metal	6.5	10.1
Glass	2.9	9.1
Plastic	1.1	20.4
Other	15.3	67.8

4. A math teacher gave her class two tests. 25% of the class passed both tests and 42% of the class passed the first test. What percent of those who passed the first test also passed the second test?

$$P(\text{pass 2nd test} | \text{pass 1st test}) = \frac{P(\text{Pass 2nd test} \cap \text{Pass 1st test})}{P(\text{pass 1st test})} = \frac{.25}{.42} = .6 \approx 60\%$$

The chart below summarizes the employees working at a certain company, by gender and degree level.

	Degree	No Degree	Total
Male	11	8	19
Female	7	5	12
Total	18	13	31

Randomly choose one person.

5.  $P(\text{degree}) = \frac{18}{31}$
6.  $P(\text{no degree}) = \frac{13}{31}$
7.  $P(\text{male} \cap \text{no degree}) = \frac{8}{31}$

8.  $P(\text{female} \cup \text{no degree}) = \frac{12}{31} + \frac{13}{31} - \frac{5}{31} = \frac{20}{31}$
9.  $P(\text{degree} | \text{female}) = \frac{7}{12}$
10.  $P(\text{no degree} | \text{male}) = \frac{8}{19}$

**Let's Practice!**

1. At Pope High School, the probability that a student takes Band and French is 0.087. The probability that a student takes Band is 0.68. What is the probability that a student takes French given that the student is taking Band?

$$P(\text{French} | \text{Band}) = \frac{P(\text{French} \cap \text{Band})}{P(\text{Band})} = \frac{0.087}{0.68} \approx 0.13$$

The frequencies of the marbles in a bag are shown in the table.

Write answers as reduced fractions.

$$\frac{20}{210} = \frac{10}{13} \quad 2. \text{ Find } P(\text{small})$$

$$\frac{2}{6} = \frac{1}{3} \quad 3. \text{ Find } P(\text{green} | \text{large})$$

	GREEN	BLUE	
LARGE	2	4	6
SMALL	8	12	20
	10	16	26

Mrs. Koehler surveyed 430 men and 200 women about their vehicles. Of those surveyed, 160 men and 85 women said they own a blue vehicle.

Write answers as reduced fractions.

$$\frac{160}{430} = \frac{16}{43} \quad 4. \text{ If a randomly chosen person is a man, what is the probability of that person having a blue car?}$$

$$\frac{385}{630} = \frac{11}{18} \quad 5. P(\text{Blue})'$$

$$\frac{115}{385} = \frac{23}{77} \quad 6. P(\text{Women} | \text{Not Blue})$$

$$\frac{270}{630} = \frac{3}{7} \quad 7. P(\text{Men} \cap \text{Not Blue})$$

	Blue	Not Blue	
Men	160	270	430
Women	85	115	200
	245	385	630

**Student Survey**

A student conducted a survey with a randomly selected group of students. She asked freshmen, sophomores, juniors, and seniors to tell her whether or not they liked the school cafeteria food. The results were as follows:

	Freshmen	Sophomores	Juniors	Seniors	Total
Liked food	85	50	77	82	294
Did not like food	44	92	56	78	270
Total	129	142	133	160	564

Use the table above to answer the questions 8 – 14.

8. What is the probability that a randomly selected student is a sophomore?  $\frac{142}{564} = \frac{71}{282}$

9. What is the probability that randomly selected student is a sophomore and likes the food?  $\frac{50}{564} = \frac{25}{282}$

10. What is the probability that a randomly selected student is a freshman or does not like the food?  $\frac{129}{564} + \frac{270}{564} - \frac{44}{564} = \frac{355}{564}$

11. What is the probability that a student does not like the food, given that student is a freshman?  $P(\text{doesn't like} | \text{freshman}) = \frac{44}{129}$

12. If the randomly selected student does not like the food, what is the probability that they are a freshman?  $P(\text{freshman} | \text{doesn't like}) = \frac{44}{270} = \frac{22}{135}$

13.  $P(\text{senior} | \text{did not like the food}) = \frac{78}{270} = \frac{13}{45}$       14.  $P(\text{liked food} | \text{freshmen}) = \frac{85}{129}$