Wednesday, May 2, 2019

- Warm-up
  - Suppose you are trying to draw a heart from a regular deck of 52 cards.
    1. After each draw, you do not replace that card before you draw again.
       a. What is the smallest number of cards you might have to draw in order to get a heart? 1
       b. What is the largest number of cards you might have to draw in order to get a heart? 40th draw (39 out) 130 130 138
    2. After each draw you do replace that card (and reshuffle) before you draw again.
       a. What is the smallest number of cards you might have to draw in order to get a heart?
       b. What is the largest number of cards you might have to draw in order to get a heart? ∞
- More with probabilities

Content Objective: I will calculate **conditional probability** using data from a table.

Social Objective: I will work with my group to solve the problems in the investigation.

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Investigation 2 Conditional Probability

$P(\text{Apple} \mid \text{Girl}) = \frac{10}{14}$ ("given")

Sometimes you are interested in the pr... you know another event occurs. For ex... be interested in knowing the probabili... he or she first plays basketball at the c... following problems, keep in mind this...

How can you find probabilities

Some boys wear sneakers and some do not. The same holds true for girls. However, in many places in the United States, boys are more likely to wear sneakers to school than are girls.

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1 Count the number of students in your classroom who are wearing sneakers. Count the number of girls. Count the number of students who are wearing sneakers and are girls. Record the number of students who fall into each category in a copy of the following table.

	Apple (Wearing Sneakers)	Android (Not Wearing Sneakers)	Total
Boy	7	6	13
Girl	10	4	14
Total	17	10	27

2 way table

contingency table

$P(\text{Apple}) = \frac{17}{27}$

$P(\text{Girl}) = \frac{14}{27}$

$P(\text{Apple and Girl}) = \frac{10}{27}$ (both)

$P(\text{Apple OR Girl}) = \frac{17}{27} + \frac{14}{27} - \frac{10}{27} = \frac{21}{27}$

2 The phrase "*the probability event A occurs given that event B occurs*" is written symbolically as $P(A \mid B)$. This **conditional probability** sometimes is read as "the probability of A given B." The table below categorizes the preferences of 300 students in a junior class about plans for their prom.

		Preference for Location	
		Hotel	Rec Center
Preference for Band	Hip-Hop	73	80
	Classic Rock	55	92

Suppose you pick a student at random from this class. Find each of the following probabilities.

a. $P(\text{prefers hotel})$

b. $P(\text{prefers hip-hop band})$

c. $P(\text{prefers hotel and prefers hip-hop band})$

d. $P(\text{prefers hotel or prefers hip-hop band})$

e. $P(\text{prefers hotel} \mid \text{prefers hip-hop band})$

f. $P(\text{prefers hip-hop band} \mid \text{prefers hotel})$

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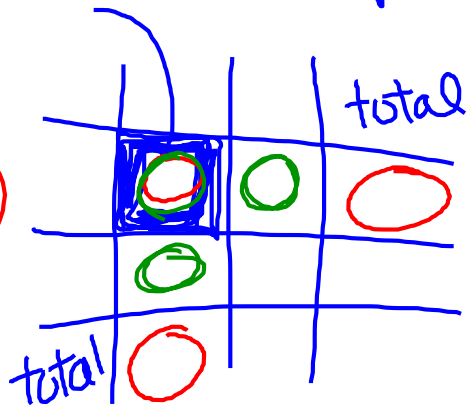
$P(A|B) = \frac{P(A \text{ AND } B)}{P(B)}$

Formal Notes – Using a 2 way table

- AND → Both events at the same time = "overlap"
  - one box / grand total
  - P(Queen AND Black) = $\frac{2}{52}$
- OR → Either event happening (A or B)
  - $\frac{A}{\text{grand total}} + \frac{B}{\text{grand total}} - \frac{A \text{ and } B}{\text{grand total}}$
  - all individual cells



- Given (conditional probability)
  - $P(A|B)$ → changes denominator to "subtotal B"
  - "given"

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Brain Break

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A survey of 505 teens by the American Academy of Dermatology included 254 boys and 251 girls. Thirty-three percent of the boys said they wear sunscreen, and 53% of the girls said they wear sunscreen.

0.33 × 254

a. Fill in a copy of the following table, showing the number of teenagers who fell into each category.

	Boy	Girl	Total
Wear Sunscreen	84	133	217
Don't Wear Sunscreen	170	118	288
Total	254	251	505

Source: www.aad.org/public/News/NewsReleases/Press+Release+Archives/Skin+Cancer+and+Sun+Safety/Teen+Survey+Results.htm

e

1. P(sunscreen) = $\frac{217}{505}$
2. P(boy) = $\frac{254}{505}$
3. P(sunscreen AND boy) = $\frac{84}{505}$
4. P(sunscreen OR boy) = $\frac{387}{505}$
5. P(sunscreen | boy) =
6. Are wearing sunscreen & being a boy mutually exclusive?
7. Are wearing sunscreen & being a boy independent?

$\frac{84}{254}$

Objectives

Content: I will define **independence** and **mutually exclusive** and apply these ideas to other questions.

Social: I will use my time wisely to work and figure things out.

Language: I will write clear definitions of **independence** and **mutually exclusive** that make sense to me.

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Exit Slip

A store is deciding whether to install a new security system to prevent shoplifting. Based on store records, the security manager of the store estimates that 10,000 customers enter the store each week, 24 of whom will attempt to shoplift. Based on data provided from other users of the security system, the manager estimates the results of the new security system in detecting shoplifters would be as shown in the table below.

	Alarm sounds	Alarm does not sound	Total
Customer attempts to shoplift	21	3	24
Customer does not attempt to shoplift	35	9,941	9,976
Total	56	9,944	10,000

According to the manager's estimates, if the alarm sounds for a customer, what is the probability that the customer did *not* attempt to shoplift?

A) 0.03%

B) 0.35%

C) 0.56%

D) 62.5%

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B) 0.35%
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D) 62.5%

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