Monday, April 22, 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 (one)
       b. What is the largest number of cards you might have to draw in order to get a heart? 13+13+13 40
    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? 1 (one)
       b. What is the largest number of cards you might have to draw in order to get a heart? infinity ∞
- 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.

Language Objective: I will read questions carefully and paraphrase to group members what the question is asking.

Investigation 2 Conditional Probability

$P(\text{Apple} \mid \text{Boy}) = \frac{13}{22}$ ("given") changes denominator

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

13/31

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.

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.

2 way table

Apple Android

	Wearing Sneakers	Not Wearing Sneakers	Total
Boy	13	9	22
Girl	5	4	9
Total	18	13	31

P(event) = favorable / total

$P(\text{Boy} \mid \text{Apple}) = \frac{13}{18}$

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- Suppose you select a student at random from your class. What is the probability that the student is wearing sneakers?

  $P(\text{Apple}) = \frac{18}{31}$ $P(\text{Boy}) = \frac{22}{31}$ $P(\text{Apple AND Boy}) = \frac{13}{31}$ * total hasn't changed both criteria

- Suppose you select a student at random from your class. What is the probability that the student is a girl?

  $P(\text{Boy or Apple}) = \frac{13+9+5}{31} = \frac{27}{31}$ one or the other or both

  ↖ same answer ↙ different method

- Using the table, what is the probability that the student is wearing sneakers AND is a girl?
- Using the table, what is the probability that a student is wearing sneakers OR is a girl?

  * total hasn't changed

  $\frac{22}{31} + \frac{18}{31} - \frac{13}{31} = \frac{27}{31}$

- Using the table, what is the probability that a student is wearing sneakers given that she is a girl?

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	total
Preference for Band	Hip-Hop	73	80	153
	Classic Rock	55	92	
	total	128		300

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

a. $P(\text{prefers hotel}) = \frac{128}{300}$

b. $P(\text{prefers hip-hop band}) = \frac{153}{300}$

c. $P(\text{prefers hotel and prefers hip-hop band}) = \frac{73}{300}$

d. $P(\text{prefers hotel or prefers hip-hop band}) = \frac{208}{300}$

e. $P(\text{prefers hotel} \mid \text{prefers hip-hop band}) = \frac{73}{153}$

f. $P(\text{prefers hip-hop band} \mid \text{prefers hotel}) = \frac{73}{128}$

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