5 for 5 1st

Quiz 5.2 today

If there is time, we will start into 5.3 :)

8

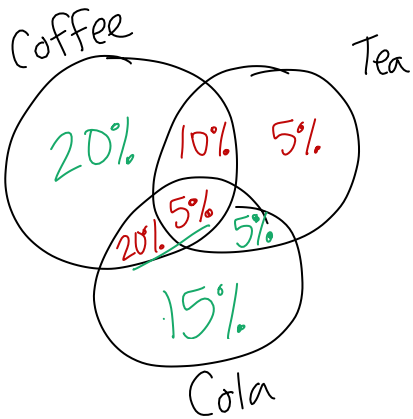
a)

b) $P(1st) = 0.12$

c) $P(1st \text{ or } 2nd) = 0.33$

d) $P(\text{none}) = 0.67$

11)



a) 15%

b) 20%

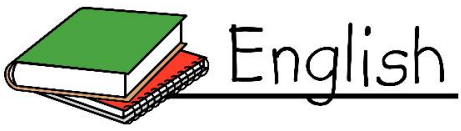
Find your formula sheet and probability flow chart

Unit 5 Test Friday

Name: _____ Hour: _____ Date: _____

You will get your quizzes back tomorrow

Lesson 5.3: Day 1: Do you prefer English or Math?



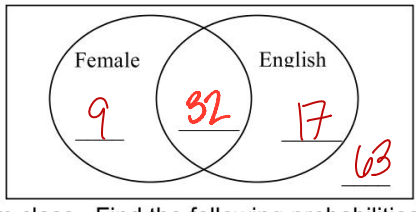
VS

Definition: Two events are **independent** if knowing whether or not one event has occurred does not change the probability that the other event will occur.

Are the events "Female" and "prefers English" independent?

1. Collect class data to fill in the following two-way table and Venn Diagram.

	English	Math	Total
Female	32	9	41
Male	17	63	80
Total	49	72	121



2. Suppose that we randomly choose a student from class. Find the following probabilities.

P(Female) = $41/121 = 0.339$ P(English) = $49/121 = 0.405$

P(not Female) = $80/121 = 0.661$ P(not English) = $72/121 = 0.595$

P(Female AND English) = $32/121 = 0.2645$ P(English AND not Female) = $17/121 = 0.1405$

P(Female AND not English) = $9/121 = 0.0744$

P(not Female AND not English) = $63/121 = 0.5207$

3. Find P(Female OR English).

$P(F) + P(E) - P(F \cap E)$

$41 + 49 - 32 = 58/121 = 0.4793$

4. What is the probability that a student prefers English, given that they are a female? Write as a percent.

$\frac{32}{41} = .78$ 78%

$P(E|F) = \frac{P(E \cap F)}{P(F)}$

Conditional Prob

5. What is the probability that a student prefers English, given that they are a male? Write as a percent.

$P(E|M) = \frac{P(E \cap M)}{P(M)} = \frac{17}{80} = 21.25\%$

6. Are the events "Female" and "prefers English" independent? Explain.

$P(F) \cdot P(E) = P(F \cap E)$

$\frac{41}{121} \cdot \frac{49}{121} = \frac{32}{121}$

$0.137 = 0.264$

Not Independent b/c there R females who also prefer English.

TheStatsMedic

Name: _____ Hour: _____ Date: _____

To get a deeper look at independence, consider the following distribution of all seniors at EKHS.

	English	Math	Total
Female	180	140	320
Male	150	130	280
Total	330	270	600

7. Find each of the following using the data in the table:

a. P(English)

$\frac{330}{600} = 0.55$

b. P(English | Female)

$\frac{180}{320} = 0.5625$

c. P(English | not Female)

$150/280 = 0.5357$

8. Fill in the table as if the events WERE independent.

$P(E) \cdot P(F) = P(E \cap F)$

	English	Math	Total
Female	176	144	320
Male	154	126	280
Total	330	270	600

9. Find each of the following using the INDEPENDENT table:

$P(E) = P(E|F) = P(E|F^c)$

a. P(English)

$330/600 = 0.55$

b. P(English | Female)

$176/320 = 0.55$

c. P(English | Not Female)

$154/280 = 0.55$

10. What do you notice about your answers in #7 and #9?

When they r not independent, (#7) the probs r all different. When they r independent (#9) the probs are all equal

11. Generalize: Complete the following statement:

If events A and B are independent then…

$P(A) = P(A|B) = P(A|B^c)$

Name: _____ Hour: _____ Date: _____

Lesson 5.3: Day 1: Conditional Probability and Independence

Big Ideas:

Conditional Prob

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

Prob A given B

Independent

When knowing an event has or has not happened does not affect the prob. of 2nd event

$P(A) = P(A|B) = P(A|B^c)$

Check Your Understanding: then A & B R indep.

Yellowstone National Park surveyed a random sample of 1526 winter visitors to the park. They asked each person whether he or she owned, rented, or had never used a snowmobile. Respondents were also asked whether they belonged to an environmental organization (like the Sierra Club). The two way table summarizes the survey responses.

		Environmental club		
		No	Yes	Total
Snowmobile experience	Never used	445	212	657
	Renter	497	77	574
	Owner	279	16	295
	Total	1221	305	1526

Suppose we randomly select one of the survey respondents. Define events E: environmental club member, S: snowmobile owner, and N: never used.

1. Find P(N | E). Interpret this value in context.

$P(N|E) = \frac{P(N \cap E)}{P(E)}$

212/305 = 0.6951

The probability that someone has never used a snowmobile given they are in the environmental club is 0.6951.

2. Given that the chosen person is not a snowmobile owner, what's the probability that she or he is an environmental club member? Write your answer as a probability statement using correct symbols for the events.

$P(E|S^c) = \frac{P(E \cap S^c)}{P(S^c)} = \frac{289}{1231} = 0.23$

3. Are the events "Snowmobile owner" and "Environmental club member" independent? Explain.

A = snowm

$P(Snow) = \frac{295}{1526} = 0.1933$

No b/c $P(S) \neq P(S|E) \neq P(S|E^c)$

$P(Snow|Envno) = \frac{16}{305} = 0.0525$

$P(Snow|E^c) = \frac{279}{1221} = 0.2285$

If you are in the enrivonmental club you are less likely to own a snowmobile.