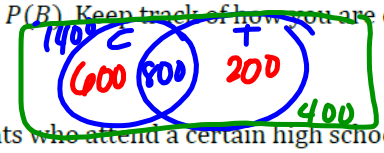
A Practice Understanding Task

Answer the questions below using your knowledge of conditional probability (the probability of *A* given *B* as *P(A* and *B)* / *P(B)*) as well as the definition of independence. Two events (A and B) are said to be independent if $P(A|B) = P(A)$ *and* $P(B|A) = P(B)$. Keep track of how you are determining independence for each type of representation.



$P(A) \cdot P(B) = P(A \cap B)$ / $P(B)$ $= P(A|B)$

1. Out of the 2000 students who attend a certain high school, 1400 students own cell phones, 1000 own a tablet, and 800 have both. Create a Venn diagram model for this situation. Use proper probability notation as you answer the questions below.

   a) What is the probability that a randomly selected student owns a cell phone? $P(C) = \frac{1400}{2000} = 70\%$

   b) What is the probability that a randomly selected students owns both a cell phone and a tablet? $\frac{800}{2000} = 40\%$ $P(C \cap T) =$

   c) If a randomly selected student owns a cell phone, what is the probability that this student also owns a tablet? $800/1400 = 57\%$ $P(T|C) =$

   d) How are questions b and c different?

   b) is out of ALL c) is out of students w/cell phones

   e) Are the outcomes, *owns a cell phone* and *owns a tablet,* independent? Explain.

$P(t|c) = P(t)$

$57\% \neq \frac{1000}{2000} = 50\%$

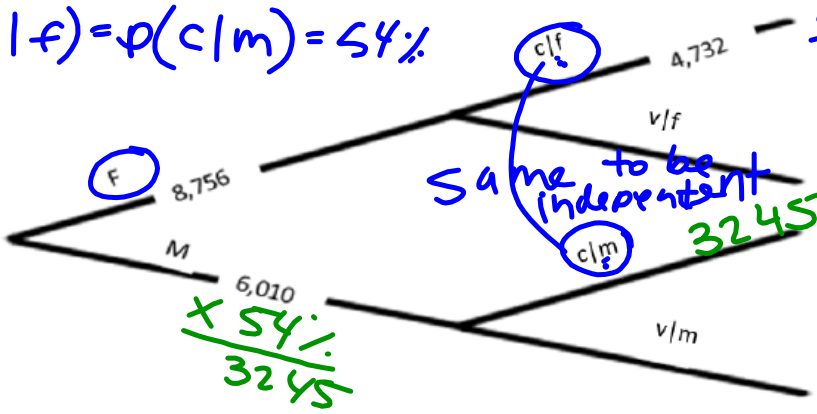
Dependent

2. Below is a partially completed tree diagram from the task *Chocolate vs Vanilla.*

a) Circle the parts of the diagram that would be used to determine if choosing chocolate is independent of being a male or female. ✓

b) Complete the diagram so that choosing chocolate is independent of being male or female.

$P(C|f) = P(C|m) = 54\%$



3. Use the data from the Titantic below to answer the following questions.

	Survived	Did not survive	Total
Men	146	659	805
Women	296	106	402
Total	442	765	1207

a) Determine if survival is independent of being male for this data. Explain or show why or why not. If it is not independent determine how many men would need to survive in order to make it independent.

$P(M) \stackrel{?}{=} P(M/S)$

$\frac{805}{1207} = \frac{M}{S} = \frac{146}{442}$

$67\% \neq 33\%$.

dependent

To make independent:

$\frac{805}{1207} = \frac{x}{442}$

$295 = x$

4. Determine whether the second scenario would be dependent or independent of the first scenario. Explain.

a) Rolling a six-sided die, then drawing a card from a deck of 52 cards. Indep.

b) Drawing a card from a deck of 52 cards, then drawing another card from the same deck. Dep.

c) Rolling a six-sided die, then rolling it again. Indep.

d) Pulling a marble out of a bag, replacing it, then pulling a marble out of the same bag. Indep

e) Having 20 treats in five different flavors for a soccer team, with each player taking a treat. Dep.

SECONDARY MATH II // MODULE 9
PROBABILITY – 9.6

9.6

READY, SET, GO! Name Period Date

READY

Topic: Solving quadratics $x =$

Solve each of the quadratics below using an appropriate method.

1. $m^2 + 15m + 56 = 0$

2. $5x^2 - 3x + 7 = 0$

3. $x^2 - 10x + 21 = 0$

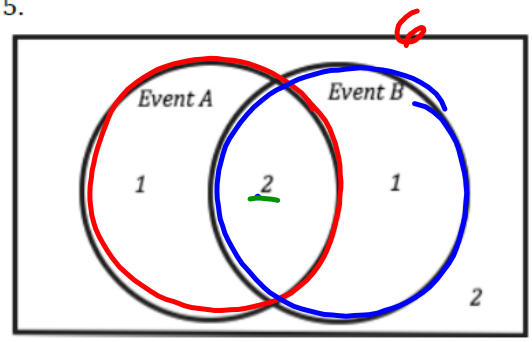
4. $6x^2 + 7x - 5 = 0$

SET

Topic: Representing Independent Events in Venn Diagrams

In each of the Venn Diagrams the number of outcomes for each event are given, use the provided information to determine the conditional probabilities or independence. The numbers in the Venn Diagram indicate the number of outcomes in that part of the sample space.

5.



a. How many total outcomes are possible? 6

b. P(A) = $\frac{3}{6}$ 50%

c. P(B) = $\frac{3}{4}$ 50%

d. P(A∩B) = $\frac{2}{6}$ 33%

and

e. P(A/B) = $\frac{A}{B}$ $\frac{2}{3}$ = 67%

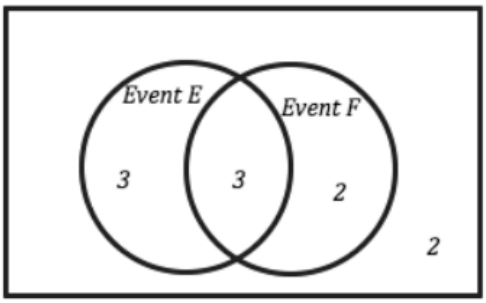
f. Are events A and B independent events? Why or why not?

$P(A) \cdot P(B) = P(A \cap B)$

$\frac{3}{6} \cdot \frac{3}{6} \neq \frac{2}{6}$ Dependent.

$\frac{9}{36} \neq \frac{1}{3}$

6.



a. How many total outcomes are possible?

b. P(E) =

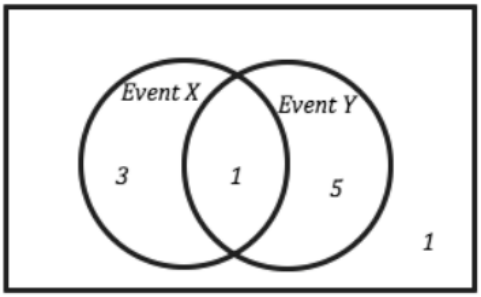
c. P(F) =

d. $P(E \cap F)$ =

e. P(E|F) =

f. Are events E and F independent events? Why or why not?

7.



a. How many total outcomes are possible?

b. P(X) =

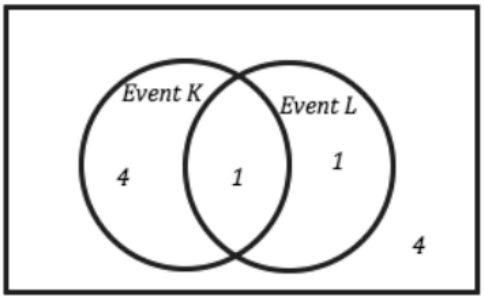
c. P(Y) =

d. P(X∩Y) =

e. P(X|Y) =

f. Are events X and Y independent events? Why or why not?

8.



a. How many total outcomes are possible?

b. P(K) =

c. P(L) =

d. P(K∩L) =

e. P(K|L) =

f. Are events K and L independent events? Why or why not?

GO

Topic: Conditional Probability and Independence

Data gathered on the shopping patterns during the months of April and May of high school students from Peanut Village revealed the following. 38% of students purchased a new pair of shorts (call this event H), 15% of students purchased a new pair of sunglasses (call this event G) and 6% of students purchased both a pair of short and a pair of sunglasses.

9. Find the probability that a student purchased a pair of sunglasses given that you know they purchased a pair of shorts. P (G|H) =

10. Find the probability that a student purchased a pair of shorts or purchased a new pair of sunglasses. P (H ∪ G) =

11. Given the condition that you know a student has purchased at least one of the items. What is the probability that they purchased only one of the items?

12. Are the two events H and G independent of one another? Why or Why not?

Given the data collected from 200 individuals concerning whether or not to extend the length of the school year in the table below answer the questions.

	For	Against	No Opinion	
Youth (5 to 19)	7	35	12	
Adults (20 to 55)	30	27	20	
Seniors (55 +)	25	16	28	
				200

13. Given that condition that a person is an adult what is the probability that they are in favor of extending the school year? P(For|Adult) =

14. Given the condition that a person is against extending the school year what is the probability they are a Senior? P (Senior|Against) =

15. What is the probability that a person has no opinion given that they are a youth?
P (no opinion| youth) =