Secondary Two Mathematics: An Integrated Approach
Module 9
Probability

By

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In partnership with the Utah State Office of Education

Module 9 – Probability

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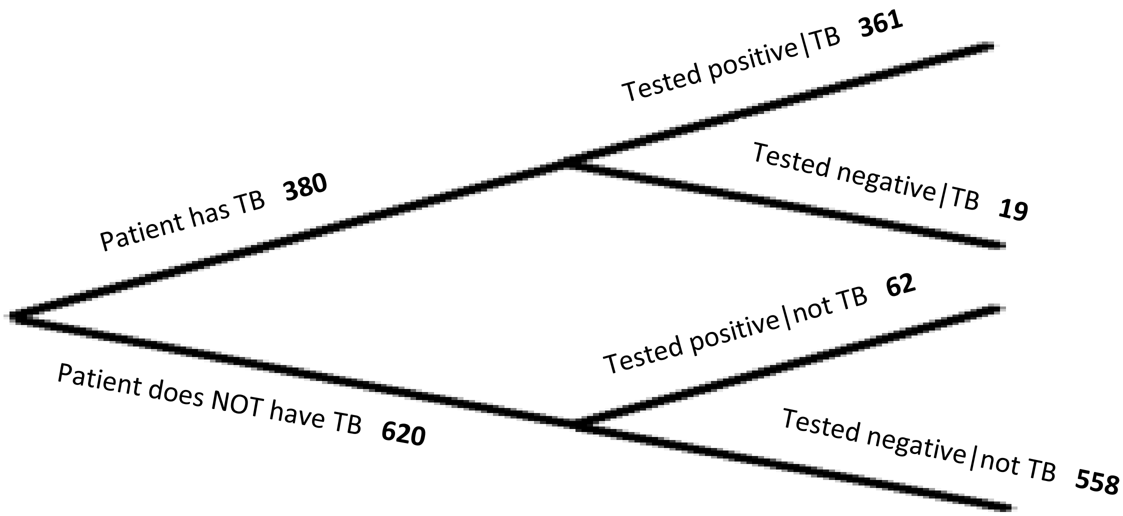
9.1 TB or Not TB?

A Develop Understanding Task

Tuberculosis (TB) can be tested in a variety of ways, including a skin test. If a person has turberculosis antibodies, then they are considered to have TB. Below is a tree diagram representing data based on 1,000 people who have been given a skin test for turberculosis.



1. Use your knowledge to write several probability statements about this test (based on the numbers provided).

2. Look over the statements you wrote. Put an asterisk (*) next to those that are conditional probability statements (statements based on margin "row" or "column" percentages). If there are not any, add some now.

3. Part of understanding the world around us is being able to take information, make sense of it, and then explain it to others. Based on your statements above, what would you say to a friend regarding the validity of their results if they are testing for TB and only get a skin test? Be sure to use data to best inform your friend.

Other questions to consider….

4. In this situation, explain the consequences of errors (having a test with incorrect results).

5. If a health test is not 100% certain, why might it be beneficial to have the results lean more toward a false positive?

6. Is a sample space of 200 enough to indicate whether or not this is true for an entire population?

7. How would you answer the young adult who tested positive and asks, “Do I really have TB?”

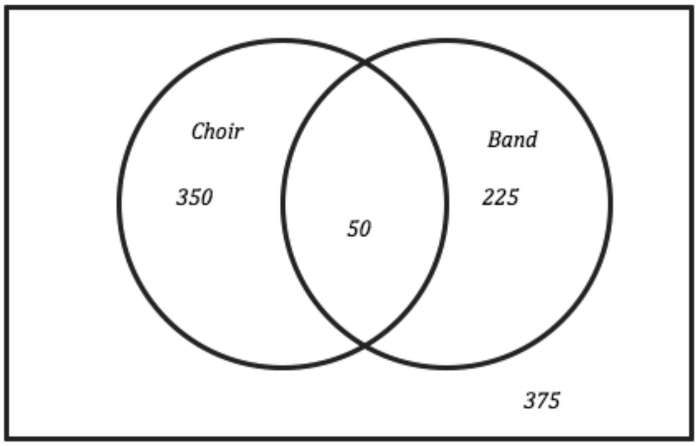
Name:

Ready, Set, Go!

Ready

Topic: Venn Diagrams, create and read.

For each Venn Diagram provided answer the questions.



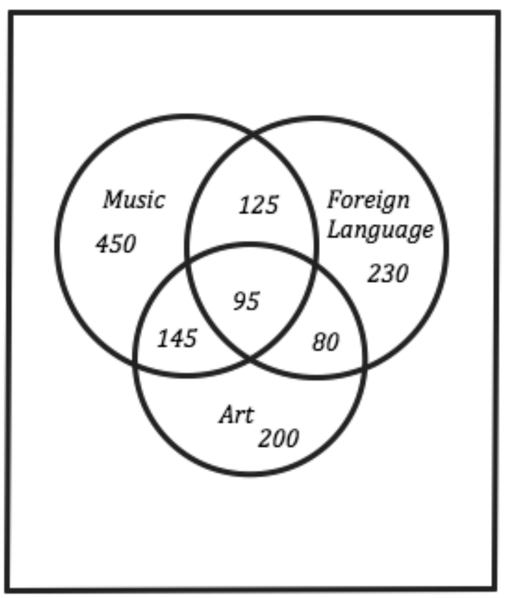
1. How many students were surveyed?

2. What were the students asked?

3. How many students are in both choir and band?

4. How many students are not in either choir or band?

5. What is the probability that a randomly selected student would be in band?



This Venn Diagram represents enrollment in some of the elective courses.

6. What does the 95 in the center tell you?

7. What does the 145 tell you?

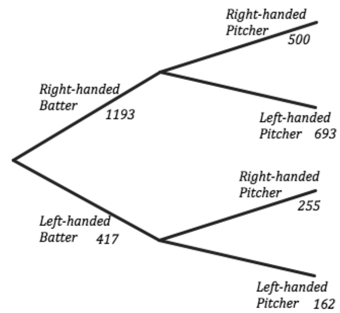
8. How many total students are represented in the diagram?

9. Which elective class has the least number of students enrolled?

Set

Topic: Interpret a tree diagram, making observations of probability.

Given the tree diagram below answer the questions and determine the probabilities. The diagram represents the number of plate appearances during the first month of a minor league baseball season.



10. How many times did a batter come to the plate during this time period?

11. Based on this data, if you are a left-handed batter what is the probability that you will face a right-handed pitcher?

12. Based on this data, if you are a right-handed batter what is the probability that you will face a left-handed pitcher?

13. What is the probability that a left-handed pitcher will be throwing for any given plate appearance?

14. What is the probability that a left-handed batter would be at the plate for any given plate appearance?

15. What observations do you make about the data? Is there any amount that seems to be overly abundant? What might account for this?

Go

Topic: Basic Probability

Find the probability of achieving success with each of the events below.

16. Rolling an even number on standard six-sided die.

17. Drawing a black card from a standard deck of cards.

18. Flipping a coin and getting Heads three times in a row.

19. Rolling a die and getting a four.

20. Drawing an ace from a deck of cards.

21. Rolling a die twice in a row and getting two threes.

22. From a bag containing 3 blue, 2 red, and 5 white marbles. Pulling out a red marble.

9.2 Chocolate versus Vanilla

A Solidify Understanding Task

Danielle loves chocolate ice cream much more than vanilla and was explaining to her best friend Raquel that so does most of the world. Raquel disagreed and thought vanilla is much better. To settle the argument, they created an online survey asking people to choose their favorite ice cream flavor between chocolate and vanilla. After completing the survey, the following results came back:

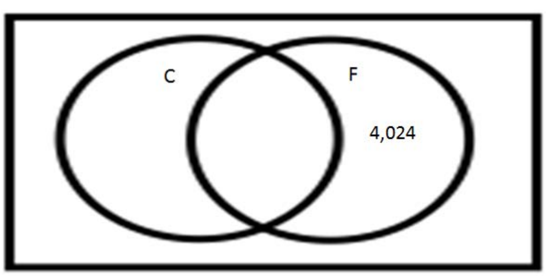
- There were 8,756 females and 6,010 males who responded.
- Out of all the males, 59.7% chose vanilla over chocolate.
- 4,732 females chose chocolate.

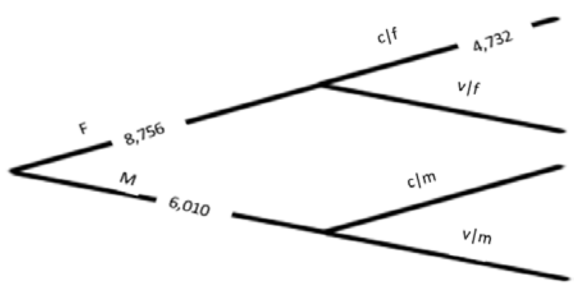
1. Upon first observations, which flavor do you think "won"? ___________________. Write a sentence describing what you see at 'first glance' that makes you think this.

2. Raquel started to organize the data in the following two-way table. See if you can help complete this (using counts and not percentages):

	Chocolate	Vanilla	Total
Female			8,756
Male			6,010
Total			

3. Organize the same data in a Venn diagram and a tree diagram.





4. Using your organized data representations, write probabilities that help support your claim regarding the preferred flavor of ice cream. For each probability, write a complete statement as well as the corresponding probability notation.

5. Looking over the three representations (tree diagram, two-way table, and Venn diagram), what probabilities seem to be easier to see in each? What probabilities are hidden or hard to see?

Highlighted (easier to see)	**Hidden**
Tree diagram	Tree diagram
Two-way table	Two-way table
Venn diagram	Venn diagram

6. Getting back to ice cream. Do you think this is enough information to proclaim the statement that one ice cream is favored over another? Explain.

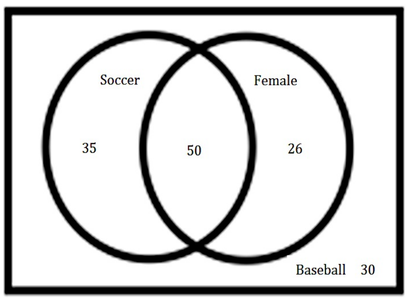
Ready, Set, Go!

Ready

Topic: Analyzing data in a Venn Diagram

Use the Venn Diagrams below to answer the following questions. (Hint: you may use the same data provided in the two-way table from question 3 on the next page to help make sense of the Venn Diagram)

The following Venn Diagram represents the relationship between favorite sport (Soccer or Baseball) and gender (Female or Male).



1. How many people said soccer is their favorite sport?

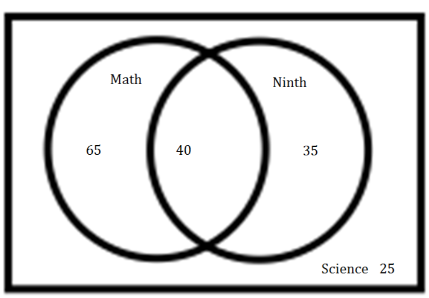
2. How many females are in the data?

3. How many males chose baseball?

4. What is the probability that a person would say soccer is their favorite sport? P(soccer) =

5. What is the probability that a female would say soccer is their favorite sport? ("Out of all females, ____% say soccer is their favorite sport") P(soccer | female) =

The following Venn Diagram represents the relationship between favorite subject (Math or Science) and grade level (Ninth or Tenth). Using this data, answer the following questions.



6. How many people said math is their favorite subject?

7. How many tenth graders are in the data?

8. How many ninth graders chose science?

9. What is the probability that a person would say science is their favorite subject? P(s) = 30

10. What is the probability that a tenth grader would say science is their favorite subject? ("If you are a tenth grader, then the probability of science being your favorite subject is _____ %") P(science | tenth)=

Set

Topic: Writing conditional statements from a two-way table.

11. Complete the table and write three conditional statements.

	Soccer	Baseball	Total
Male		30	
Female	50		76
Total	85		

12. Complete the table about preferred genre of reading and write three conditional statements.

	Fiction	Non-Fiction	Total
Male		10	
Female	50		60
Total	85		

13. Complete the table about favorite color of M&M's and write three conditional statements.

	Blue	Green	Red	Other	Total
Male	15	20	15		60
Female	30	20		10	
Total	45				130

14. Use the information provided to make a tree diagram, a two-way table and a Venn Diagram.

- Data was collected at the movie theater last fall. Not about movies but clothes.
- 6,525 people were observed.
- 3,123 had on shorts and the rest had on pants
- 45% of those wearing shorts were denim.
- Of those wearing pants 88% were denim.

Go

Topic: Fractions, Percent and there operations

Find the desired values.

15. What is half of one-third?

16. What is one-third of two-fifths?

17. What is one-fourth of four-sevenths?

18. What percent is $\frac{5}{8}$?

19. What is 35% of 50?

20. Seventy is 60% of what number?

21. Write $\frac{7}{12}$ as a percent.

22. Write $\frac{1}{6}$ as a percent.

23. What is 52% of 1,200?

24. What percent is 32 of 160?

25. Sixty is what percent of 250?

26. What percent of 350 is 50?

9.3 Fried Freddy's

A Solidify Understanding Task

Danielle was surprised by the results of the survey to determine the 'favorite ice cream' between chocolate and vanilla (See task 9.2 *Chocolate vs. Vanilla*). The reason, she explains, is that she had asked several of her friends and the results were as follows:

	Chocolate	Vanilla	Total
Female	23	10	33
Male	6	8	14
Total	29	18	47

1. In this situation, chocolate is most preferred. How would you explain to her that this data may be less 'valid' compared to the data from the online survey?

Using a sufficiently large number of trials helps us estimate the probability of an event happening. If the sample is large enough, we can say that we have an estimated probability outcome for the probability of an event happening. If the sample is not randomly selected (only asking your friends) or not large enough (collecting four data points is not enough information to estimate long run probabilities), then one should not estimate large scale probabilities. Sometimes, our sample increases in size over time. Below is an example of data that is collected over time, so the estimated probability outcome becomes more precise as the sample increases over time.

Freddy loves fried food. His passion for the perfect fried food recipes led to him opening the restaurant, "Fried Freddies." His two main dishes are focused around fish or chicken. Knowing he also had to open up his menu to people who prefer to have their food grilled instead of fried, he created the following menu board:

Fried Freddy's

Choose dish: Chicken or Fish

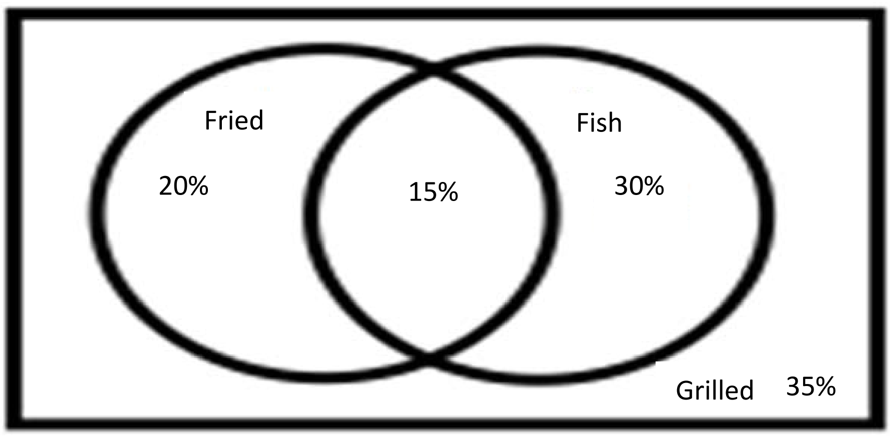
Choose cooking preference: Grilled or Fried

$7.95

After being open for six months, Freddy realized he was having more food waste than he should because he was not predicting how much of each he should prepare in advance. His business friend, Tyrell, said he could help.

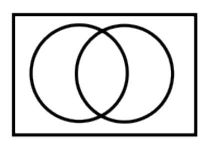
2. What information do you think Tyrell would need?

Luckily, Freddy uses a computer to take orders each day so Tyrell had lots of data to pull from. After determining the average number of customers Freddy serves each day, Tyrell created the following Venn diagram to show Freddy the food preference of his customers:

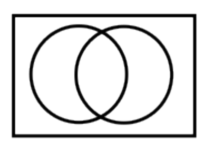


To make sense of the diagram, Freddy computed the following probability statements:

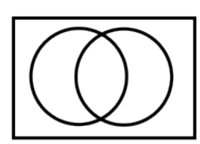
3. What is the probability that a randomly selected customer would order fish?
   P(fish) =
   Shade the part of the diagram that models this solution.



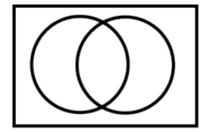
4. What is the probability that a randomly selected customer would order fried fish?
   P(fried ∩ fish) = P(fried and fish) =
   Shade the part of the diagram that models this solution.



5. What is the probability that a person prefers fried chicken?
   P(fried∩chicken) = P(fried and chicken) =
   Shade the part of the diagram that models this solution.

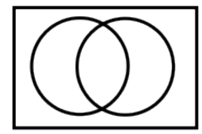


6. What is the estimated probability that a randomly selected customer would want their fish grilled?
   P(grilled and fish) = P(____________________) =
   Shade the part of the diagram that models this solution.

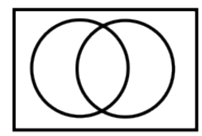


7. If Freddy serves 100 meals at lunch on a particular day, how many orders of fish should he prepare with his famous fried recipe?

8. What is the probability that a randomly selected person would choose fish or fried?
   P(fried∪fish) = P(fried or fish) =
   Shade the part of the diagram that models this solution.



9. What is the probability that a randomly selected person would NOT choose fish or fried?
   Shade the part of the diagram that models this solution.



Name: Probability 9.3

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Ready, Set, Go!

Ready

Topic: Independent and Dependent events

In some of the situations described below the first event effects the subsequent event (dependent events). In others each of the events is completely independent of the others (independent events). Determine which situations are dependent and which are independent.

1. A coin is flipped twice. The first event is the first flip and the second event is the next flip.

2. A bag of marbles contains 3 blue marbles, 6 red marbles and 2 yellow marbles. Two of the marbles are drawn out of the bag. The first even is the first marble taken out the second event is the second marble taken out.

3. An attempt to find the probability of there being a right-handed or a left-handed batter a the plate in a baseball game. The first event is the 1st batter to come to the plate. The second event is the second player to come up to the plate.

4. A standard die is rolled twice. The first event is the first roll and the second event is the second roll.

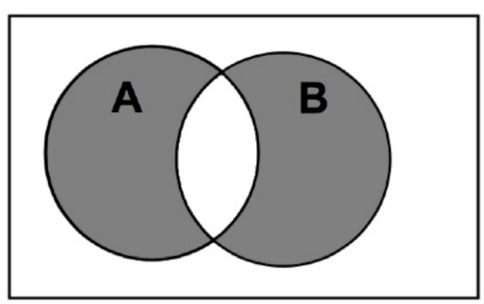
5. Two cards are drawn from a standard deck of cards. The first event is the first card that is drawn the second event is the second card that is drawn.

Set

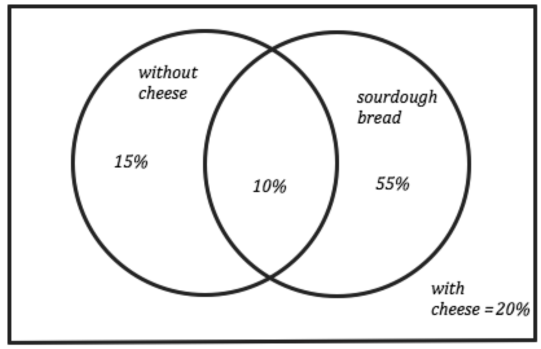
Topic: Addition Rule, interpreting a Venn Diagram

6. Sally was assigned to create a Venn diagram to represent $P(A \text{ or } B)$. Sally first writes $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, what does this mean? Explain each part.

7. Sally then creates the following diagram. Sally's Venn diagram is incorrect. Why?



The Venn diagram to the right shows the data collected at a sandwich shop for the last six months with respect to the type of bread people ordered (sourdough or wheat) and whether or not they got cheese on their sandwich. Use this data to create a two-way frequency table and answer the questions.



8. Two-way frequency table

9. What is the probability that a randomly selected customer would order sourdough bread?
   P(sourdough bread) =

10. What is the probability that a randomly selected customer would order sourdough bread without cheese?
    P(sourdough ∩ no cheese) = P(sourdough and no cheese) =

11. What is the probability that a person prefers wheat bread without cheese?
    P(wheat ∩ no cheese) = P(wheat and no cheese) =

12. What is the estimated probability that a randomly selected customer would want their sandwich with cheese?
    P(sourdough cheese and wheat cheese) = P(__________________) =

13. If they serve 100 sandwiches at lunch on a particular day, how many orders with sourdough should be prepared without cheese?

14. What is the probability that a randomly selected person would choose sourdough or without cheese?
    P(sourdough ∪ no cheese) = P(sourdough or no cheese) =

15. What is the probability that a randomly selected person would NOT choose sourdourgh or no cheese?

Go

Topic: Equivalent ratios and proportions

Use the given ratio to set up a proportion and find the desired value.

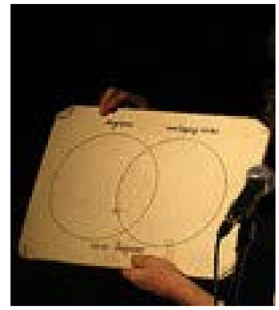
16. If 3 out of 5 students eat school lunch then how many students would be expected to eat school lunch at a school with 750 students?

17. In a well developed and carried out survey it was found that 4 out of 10 students have a pair of sunglasses. How many students would you expect to have a pair of sunglasses out of a group of 45 students?

18. Data collected at a local mall indicted that 7 out of 20 men observed were wearing a hat. How many would you expect to have been wearing hats if 7500 men were to be at the mall on a similar day?

9.4 Visualizing with Venn

A Solidify Understanding Task



One of the attributes of Venn diagram's is that it can be easy to see the relationships within the data. In this task, we will create multiple Venn diagrams using data and determine the events that create diagrams to either have an intersection or for them to be mutually exclusive.

1. The following data represents the number of men and women passengers aboard the titanic and whether or not they survived.

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

2. Create three Venn diagrams with this data.
   a. Men vs Women
   b. Women vs Survived
   c. You choose the conditions
3. Create two probability statements using each of your Venn diagrams from question 2.

4. Create and label three different Venn diagrams using this data. Create at least one that is mutually exclusive and at least one that has an intersection.

   Sample size: 100

   P(girl) = $\frac{42}{100}$

   P(girl or art) = $(\frac{42}{100} + \frac{30}{100}) - \frac{12}{100}$

   P(art) = $\frac{30}{100}$

   P(not art) =

   P(boy) =

5. Describe the conditions that create mutually exclusive Venn diagrams and those that create intersections.
6. What conjecture can you make regarding the best way to create a Venn diagram from data to highlight probabilities?

Name:

Ready, Set, Go!

Ready

Topic: Products of probabilities, multiplying and dividing fractions

Find the products or quotients below.

1. $\frac{1}{2} \cdot \frac{2}{3}$

2. $\frac{3}{5} \cdot \frac{1}{3}$

3. $\frac{7}{10} \cdot \frac{2}{5}$

4. $\frac{8}{7} \cdot \frac{3}{4}$

5. $\frac{\frac{1}{3}}{\frac{1}{2}}$

6. $\frac{2}{5} \div \frac{2}{3}$

7. $P(A) = \frac{3}{4}$ $\quad P(B) = \frac{1}{2}$

   $P(A) * P(B) =$

8. $P(A) = \frac{1}{6}$ $\quad P(B) = \frac{1}{3}$

   $P(A) * P(B) =$

Set

For each situation, one of the representations (two-way table, Venn diagram, tree diagram, context or probability notation) is provided. Use the provided information to complete the remaining representations.

9. Are you Blue?

Notation

Key:
Male = M Female = F
Blue = B Not Blue = N

Sample size = 200

$P(B) = 84/200$ $P(M) = 64/200$

$P(F|B) = 48/84$ $P(B|F) =$

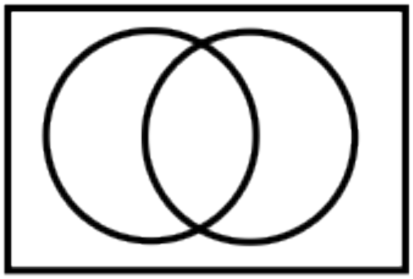
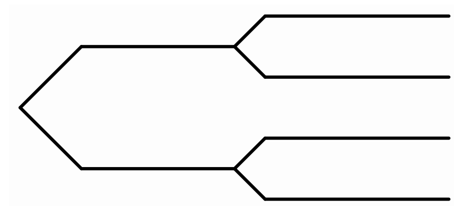
$P(M \cap B) =$ $P(M \cup B) =$

2-way Table

	Blue	Not Blue	Total
Male			
Female			
Total			

(Continued on the next page)

(Continued from the last page)

Venn Diagram	Tree Diagram
	

Write three observations you can make about this data.

10. Right and left handedness of a group.

Notation

Key:
Male = M　　Female = F
Lefty = L　　Righty = R

Sample size = 100 people

P(L) =　　P(M) =

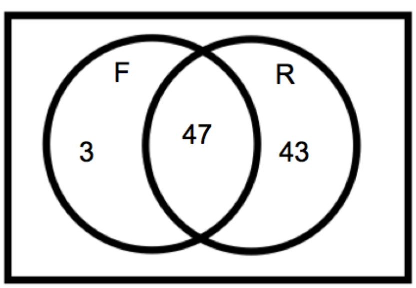
P(F) =　　P(L|F) =

P(L|M) =

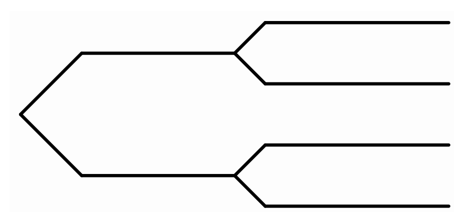
2-way Table

	Lefty	Righty	Total
Male			
Female			
Total			

Venn Diagram



Tree Diagram



Write three conditional statements regarding this data.

11. The most important meal of the day.

Notation

Key:
Male = M Female = F
Eats Breakfast = E Doesn't Eat Breakfast = D

Sample size =
P(E) = P(E|M) =

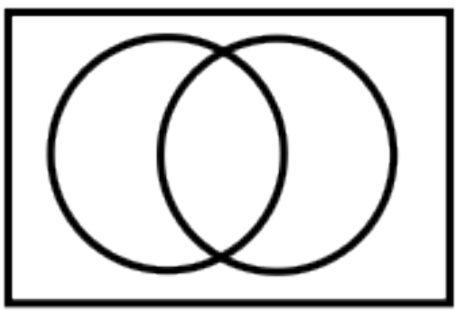
P(E∩M)= P(E|F) =

P(E∩F) =

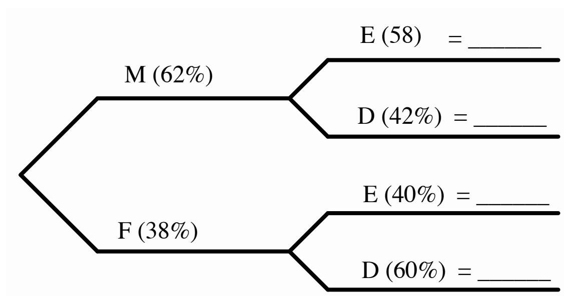
2-way Table

	Eats	Doesn't	Total
Male			
Female			
Total			685

Venn Diagram



Tree Diagram



Does this data surprise you? Why or why not.

Go

Topic: Writing conditional statements from a two-way table.

12. Complete the table and write three conditional statements.

	Biking	Swimming	Total
Male		50	
Female	35		76
Total	85		

13. Complete the table about preferred genre of reading and write three conditional statements.

	Ice Cream	Cake	Total
Male		20	
Female	10		60
Total	85		

14. Complete the table about eye color and write three conditional statements.

	Blue	Green	Brown	Other	Total
Male	55	20	15		100
Female		20		10	
Total			75		230

9.5 Freddy Revisited

A Solidify Understanding Task

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Once Tyrell helped Freddy out in determining the amount and type of food Freddy should prepare each day for his restaurant, Freddy's food waste decreased dramatically. Still, Freddy noticed that during the week, he seemed to still have more food prepared than he needed, and sometimes on the weekend he would run out of something he needed. Tyrell said another level of determining waste could be if Freddy averaged the number of orders he received of fish and chicken on a weekday and compared it to the average number of orders he received of each on the weekend. Freddy thought this was a good idea so started collecting data. After two months, he had enough information to create a two way table representing the average number of orders he received on the weekdays and on the weekends for fish and chicken. The data is below:

	Chicken	Fish	Total
Weekday	65	79	144
Weekend	88	107	195
Total	153	186	339

1. What observations can you make? Explain to Freddy what this means (When does Freddy seem to have the greatest business? Should he expect a greater percentage of customers to order fish during the week or on the weekend? What else?)

2. Does the number of orders of chicken compared to fish depend on whether it is a weekday or a weekend? What values from the table tell you this?

Name: Probability | 9.5

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Ready, Set, Go!

Ready

Topic: Quadratic Function Review

Find the x-intercepts, y-intercept, line of symmetry and vertex for the quadratic functions.

1. $f(x) = x^2 + 8x - 9$
2. $g(x) = x^2 - 3x - 5$
3. $h(x) = 2x^2 + 5x - 3$
4. $k(x) = x^2 + 6x - 9$
5. $p(x) = (x + 5)^2 - 2$
6. $q(x) = (x + 7)(x - 5)$

Set

Topic: Independence

Determining the independence of events can sometimes be done by becoming familiar with the context in which the events occur and the nature of the events. There are also some ways of determining independence of events based on equivalent probabilities.

- *Two events, A and B, are independent if P (A and B) = P (A) · P(B)*
- *Additionally, two events, A and B, are independent if* $P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = P(A)$

Use these two ways of determining independent events to determine independence in the problems below and answer the questions.

7. P (A and B) = $\frac{3}{5}$
   P (A) = $\frac{1}{2}$
   P (B) = $\frac{3}{10}$

8. P (A) = $\frac{1}{5}$
   P (A and B) = $\frac{1}{6}$
   P (B) = $\frac{1}{3}$

9. $P(A) = \frac{1}{2}$
   $P(A \text{ and } B) = \frac{1}{5}$
   $P(B) = \frac{2}{5}$

10. $P(A \text{ and } B) = \frac{2}{5}$
   $P(A) = \frac{1}{4}$
   $P(B) = \frac{4}{5}$

Go

Topic: Find probabilities from a two-way table.

The following data represents the number of men and women passengers aboard the titanic and whether or not they survived.

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

11. P(w) =

12. P(s) =

13. P(s|w) =

14. P(w or s) =

15. P(w or m) =

16. P(ns|w) =

17. $P(m \cap ns)$ =

9.6 Striving for Independence

A Practice Understanding Task

Use your knowledge of conditional probability (the probability of A given B as $P(A \text{ and } B)/P(B)$) as well as the definition of independence (two events (A and B)) are said to be independent if $P(A|B) = P(A)$ *and* $P(B|A) = P(B)$) to answer the following questions. Keep track of how you are determining independence for each type of representation.

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. Suppose a student is randomly selected. Create a Venn diagram model and use notation to answer the following questions.

   a) What is the probability that a randomly selected student owns a cell phone?

   b) What is the probability that a randomly selected students owns both a cell phone and a tablet?

   c) If a randomly selected student owns a cell phone (was one of the 1400 with a phone), what is the probability that this student also owns a tablet?

   d) How are questions *c* and *d* different?

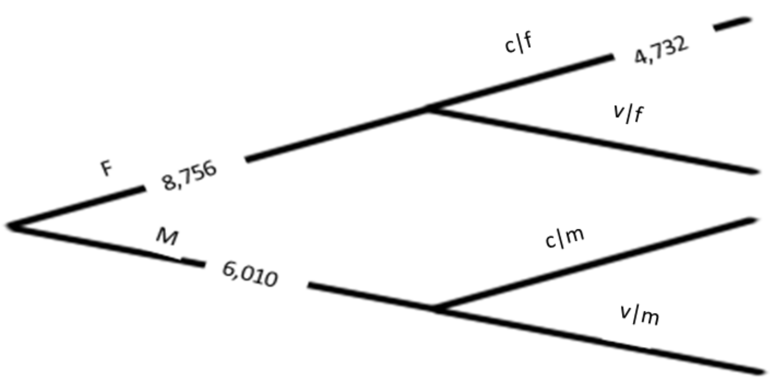
   e) Are the outcomes *owns a cell phone* and *owns a tablet* independent? Explain.

   f) If question *e* is not independent, what number of students would own a tablet to create independence?

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

   a) Circle the parts of the diagram you would use 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.



3. Use the titanic data 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 was independent of gender. Explain.
b. If gender would not have mattered, what would have been the number of males that would have survived, given the data for the number of females who survived and the total number of passengers on the ship.

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.
b) Drawing a card from a deck of 52 cards, then drawing another card from the same deck.
c) Rolling a six-sided die, then rolling it again.
d) Pulling a marble out of a bag, replacing it, then pulling a marble out of the same bag.
e) Having 20 treats in five different flavors for a soccer team, with each player taking a treat.

5. The definition of independence is that two events (A and B) are said to be independent if

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

Explain what this looks like in a Venn diagram, a tree diagram, and a two-way table.

Name: Probability | 9.6

http://www.flickr.com/photos/ronwls/

Ready, Set, Go!

Ready

Topic: End of year Review

Solve each of the quadratics below using an appropriate method.

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

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

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

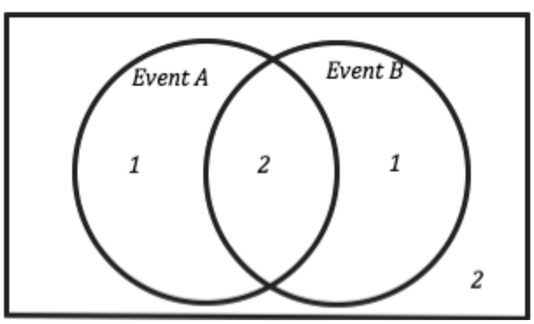
4. $6x^2 + 7x - 5 = 0$

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?

b. P(A) =

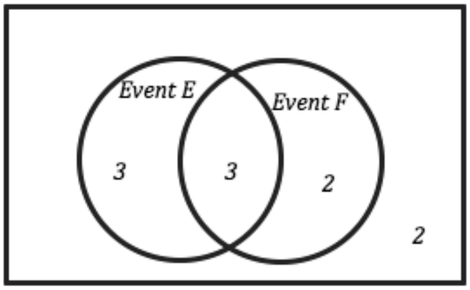
c. P(B) =

d. P(A∩B) =

e. P(A|B) =

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

6.



a. How many total outcomes are possible?

b. P(E) =

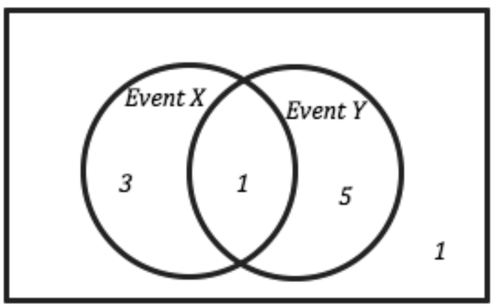
c. P(F) =

d. P(E∩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) =

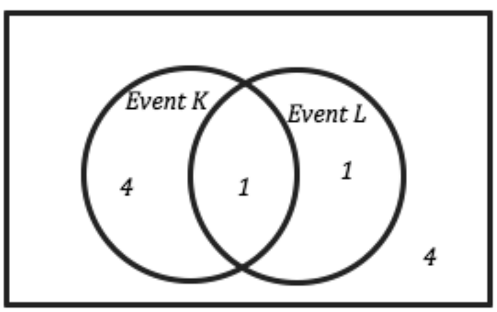
c. P(Y) =

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. $P(H \cup G) =$

11. Given the condition that you know a student has purchased at least on 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) =

Need Assistance? Check out these additional resources:
http://www.youtube.com/watch?v=t6G8mL0w4xM