Name: $\qquad$ Per: $\qquad$
Honors Analytic Geometry
Spring 2015 Unit 6/7: Probability and EOCT Review

| Date | Topic | Homework |
| :---: | :---: | :---: |
| WEB 4/22 | Yearbook Day! |  |
| Thurs 4/23 | Vocab., Set Notation, Venn Diagrams | Worksheet \#6.1 |
| Fri 4/24 | Compound Events: Mutually Exclusive vs. Overlapping | Worksheet \#6.2 \& \#6.3 |
| Mon 4/27 | Conditional Probabilities/Frequency Tables | Worksheet \#6.4 |
| Tues 4/28 | Independent vs. Dependent | Worksheet \#6.5 |
| Wed 4/29 | Using Formulas/Words | Worksheet \#6.6 |
| Thurs 4/30 | Review | Review Worksheet \#6.7 |
| Fri 5/1 | EOCT Review | Worksheet \#7.1 |
| Mon 5/4 | EOCT Review | Worksheet \#7.2 |
| Tues 5/5 | EOCT Review | Worksheet \#7.3 |
| Wed 5/6 | EOCT Review | Worksheet \#7.4 |
| Thurs 5/7 | EOCT Review | Worksheet \#7.5 |
| Fri 5/8 | EOCT Review—Released Items and Sample Questions | STUDY!!! |
| Mon 5/11 | Analytic Geometry EOCT Go to Room \# |  |
| Tues 5/12 | Analytic Geometry EOCT Go to Room \# |  |

If the Venn Diagram below shows the number of people in a fine arts club who are in band ( $B$ ) and choir (C), make the following determinates:
$\qquad$ 1. How many people are in the club?
$\qquad$ 2. Find $P(B)$
3. Find $P(B \cap C)$
$\qquad$ 4. Find $P(B \cup C)$

$\qquad$ 5. Find $P(B)^{\prime}$

A guidance counselor is planning schedules for 30 students. 16 want to take Spanish and 11 want to take Latin. 5 Say they want to take both. Display this information on the Venn Diagram below.

$\qquad$ 7. Find $P(S \cap L)$
$\qquad$ 8. Find $P(L)$
$\qquad$ 9. What is the probability that a student studies at least one subject? $\mathrm{P}(\mathrm{S} \cup \mathrm{L})$
$\qquad$ 10. What is the probability that a student studies exactly one subject?
$\qquad$ 11. What is the probability that a student studies neither subject? $P(S \cup L)$ '
$\qquad$ 12. What is the probability that a student studied Spanish if it is known that the student studies Latin?

Mr. Leary's Class: Use the Venn Diagram showing the number of kids owning bicycles (A) and skateboards ( $B$ ) to find the following probabilities.

$\qquad$ 15. Find $P(A \cup B)^{\prime}$ and describe what this probability
represents?
The Venn Diagram below shows the results of a survey done by a veterinarian about the types of pets owned by 26 clients. The survey was only related to dogs (D), cats (C), and fish (F).
$\qquad$ 16. What is the value of $k$ ?
17. How did you determine the value?

If a randomly selected member is asked their preference, what is the probability that the member has:

$\qquad$ 18. Only dogs?
$\qquad$ 19. Dogs and cats?
$\qquad$ 20. None of these animals?
$\qquad$ 21. At least one of these pets?
$\qquad$ 22. All of the pets?
_-23. Fish and dogs, but not cats?
$\qquad$ 24. Fish or dogs?

## Mutually Exclusive (Disjoint) vs Overlapping Events

Suppose that you select a person at random from your school. Are these pairs of events mutually exclusive?
$\qquad$ 1. has ridden a roller coaster; has ridden a Ferris wheel
$\qquad$ 2. has brown hair; has brown eyes
$\qquad$ 3. is left-handed; is right-handed
4. owns a classical music CD; owns a jazz music CD
$\qquad$ 5. is a senior; is a junior
$\qquad$ 6. has shoulder-length hair; is male
7. A group of senior citizens have won free vacation packages. The vacation to Bermuda is chosen by $25 \%$ of them, $60 \%$ choose Alaska, and $15 \%$ choose Costa Rica. What is the probability that one randomly chosen senior citizen chooses to vacation in Bermuda or Costa Rica?

Use the general addition rule to compute the probability that if you roll two six-sided dice,
8. you get odd sum or a sum greater than 10 .
$\qquad$ 9. you get even sum or a sum of 11 .

| + | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |

10. Of the 220 people who came into the Italian deli on Friday, 104 bought pizza and 82 used a credit card. Half of the people who bought pizza used a credit card. What is the probability that a customer bought pizza or used a credit card?

diagram below displays the results. Use the information given to find the following probabilities.
$\qquad$
$\qquad$ 12. $P(F \cup B)$

11. $P(F)^{\prime}$
12. $P(F \cup B \cup S)$
13. $P(F \cup B \cup S)^{\prime}$


Given the Venn Diagram below with set A and set B determine the following:
$\qquad$ 16. $P(A \cap B)$
17. $P(A \cup B)$
18. $P(\bar{A} \cup B)$

19. $P(A \cap \bar{B})$
20. Suppose $80 \%$ of people can swim. Suppose $70 \%$ of people can whistle. Suppose $55 \%$ of people can do both. What percentage of people can swim or whistle?
21. At Walton, $60 \%$ of the students carry a backpack or a wallet. $40 \%$ of those carry only a backpack, and $30 \%$ of those carry only a wallet. If a student is selected at random, find the probability that the student carries both a backpack and a wallet.
$\qquad$ Date: $\qquad$

## Review for Quiz

Determine if the following events are mutually exclusive or overlapping.
$\qquad$ 1. The experiment is rolling a die.

The list event: the number is greater than 3
The and event: the number is even.
$\qquad$ 2. The experiment is year in school.

The list event: the person is a senior.
The and event: the person is a junior.
$\qquad$ 3. The experiment is answering multiple choice questions.

The list event: the correct answer is chosen
The and event: the answer A is chosen.
4. The experiment is selecting a chocolate bar.

The list event: the bar has nuts
The and event: the bar has caramel.
5. One card is randomly drawn from a deck of 52 cards. The card is face down on the table. What is the probability of getting a Jack or a Spade?

Use the general addition rule to compute the probability that if you roll two six-sided dice.
$\qquad$ 6. you get doubles or a sum of 4
$\qquad$ 7. you get doubles or a sum of 7
8. you get a 5 on the first die or you get a 5 on the second die.

|  | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ | $\mathbf{5}$ | $\mathbf{6}$ |
| :---: | :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathbf{1}$ | 2 | 3 | 4 | 5 | 6 | 7 |
| $\mathbf{2}$ | 3 | 4 | 5 | 6 | 7 | 8 |
| $\mathbf{3}$ | 4 | 5 | 6 | 7 | 8 | 9 |
| $\mathbf{4}$ | 5 | 6 | 7 | 8 | 9 | 10 |
| $\mathbf{5}$ | 6 | 7 | 8 | 9 | 10 | 11 |
| $\mathbf{6}$ | 7 | 8 | 9 | 10 | 11 | 12 |

Use the Venn Diagram to answer the following questions.
9. $P(A)$
10. $\mathrm{P}(\mathrm{B})$
11. $\mathrm{P}(\mathrm{B})^{\prime}$
12. $\mathrm{P}(\mathrm{A} \cup \mathrm{B})$
13. $\mathrm{P}(\mathrm{A} \cap \mathrm{B})$


When you arrive home today, you find 27 cupcakes in a large circular plate. There are have icing 11 have sprinkles, and 4 have


13 that
both.

Use the data below to find each of the following probabilities.

## Coolest Deals Sold at Ike's

| Topping choice | Ice cream choice |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
|  | Vanilla | Chocolate | Cookie dough | Mint chip |
| Sprinkles | 9 | 12 | 16 | 14 |
| Hot fudge | 11 | 4 | 16 | 15 |
| Caramel | 10 | 12 | 18 | 15 |

$\qquad$ 18. P(Chocolate)
$\qquad$ 19. P(Chocolate)'
$\qquad$ 20. P (Sprinkles $\cap$ Cookie Dough)
21. $P($ Caramel $\cup$ Vanilla $)$

A random survey was taken to gather information about grade level and car ownership status of students at a school. This table shows the results of the survey.

Car Ownership by Grade

|  | Owns a Car | Does Not Own a Car | TOTAL |
| :---: | :---: | :---: | :---: |
| Junior | 6 | 10 | 16 |
| Senior | 12 | 8 | 20 |
| TOTAL | 18 | 18 | 36 |

1. Find the probability that a randomly selected student will be a junior, given that the student owns a car.
2. Find the probability that a randomly selected student will own a car, given that the student is a senior.

The table below shows numbers of registered voters by age in the United States in 2004 based on the census. Find each probability in decimal form.

| Age | Registered Voters <br> (in thousands) | Not Registered to Vote <br> (in thousands) |  |
| :---: | :---: | :---: | :---: |
| $18-24$ | 14,334 | 13,474 |  |
| $25-44$ | 49,371 | 32,763 |  |
| $45-64$ | 51,659 | 19,355 |  |
| 65 and over | 26,706 | 8,033 |  |
|  |  |  |  |

3. Find the probability that a randomly selected person is registered to vote, given that the person is between the ages of 18 and 24 .
4. Find the probability that a randomly selected person is not registered to vote, given that they are 65 and over.
5. Find the probability that a randomly selected person is between the ages of 45 and 64 and is not registered to vote.

A faculty advisor at Ridge High School surveyed 100 students about their preference for a social event. Of the 100 students surveyed, 50 were tenth graders and 50 were eleventh graders. Of the tenth graders, 30 chose a bowling party and 20 chose a dance. Of the eleventh graders, 20 chose a bowling party and 30 chose a dance.
6. Make a two way frequency table to represent the data.

|  | Bowling (B) | Dance (D) |  |
| :--- | :--- | :--- | :--- |
| $10^{\text {th }}$ graders (T) |  |  |  |
| $11^{\text {th }}$ graders (E) |  |  |  |
|  |  |  |  |

7. Find $P(B)$.
8. Find $P(B \mid T)$.
9. Do you think that the probability of liking bowling is dependent on whether a student is in the $10^{\text {th }}$ or $11^{\text {th }}$ grade?

Based on the definition of independence, determine if events $A$ and $B$ are independent in each case.
$\qquad$ 1. $P(A)=0.2 \quad P(B)=0.14 \quad P(A \cap B)=0.028$
2. $P(A)=0.32 \quad P(B)=0.16 \quad P(A \cap B)=0.48$
$\qquad$ 3. $P(A)=\frac{1}{3} \quad P(B)=\frac{3}{5} \quad P(A \cap B)=\frac{4}{15}$
4. 4. $P(A)=\frac{7}{8} \quad P(B)=\frac{2}{5} \quad P(A \cap B)=\frac{7}{20}$

Paola is playing a word game in which she draws letter tiles from a bag without looking. The bag contains 7 tiles: 2 As, 3 Es, and 2 Rs.
Find the probability of getting an E first and getting an E second. In each problem, state whether the events are independent, and find the probabilities.
$\qquad$ 5. Paola takes a tile, then replaces it, and then takes a second tile.
$\qquad$ 6. Paola takes a tile, does not replace it, and then takes a second tile.

Using the letters in the state ARKANSAS:
$\qquad$ 7. Find the probability of picking an $S$ and then an $A$ without replacement.
$\qquad$ 8. Find the probability of picking a $K$ and then a $N$ without replacement.
$\qquad$ 9. Find the probability of picking $a R$ and then $a S$ without replacement.
10. Two students are chosen at random from a class of 30 . What is the probability that both you and your friend are chosen?
11. A test includes several multiple choice questions, each with 5 choices. Suppose you don't know the answers for three of these questions, so you guess. What is the probability of getting all three correct?

The following chart shows favorite subjects of students based on their gender.

|  | Math | Science | English | History |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Male | 46 | 42 | 13 | 25 |  |
| Female | 12 | 21 | 45 | 36 |  |
|  |  |  |  |  |  |

$\qquad$ 12. What is the probability that a randomly chosen student likes history the most?
$\qquad$ 13. What is the probability that a randomly chosen student is a female?
$\qquad$ 14. What is the probability that a randomly chosen student is a male or likes Math?
$\qquad$ 15. What is the probability that a randomly chosen student both likes science and is a male?
$\qquad$ 16. What is the probability that a randomly chosen student likes history given that they are a female?
$\qquad$ 17. Does the probability of liking a subject depend on whether the students are male or female? Use calculations.

## Using Probability Formulas and Working Backwards

Mutually Exclusive: $\mathrm{P}(\mathrm{A} \cup \mathrm{B})=\mathrm{P}(\mathrm{A})+\mathrm{P}(\mathrm{B})$
Independent: $P(A \cap B)=P(A) \bullet P(B)$
Overlapping: $P(A \cup B)=P(A)+P(B)-P(A \cap B) \quad$ Dependent: $P(A \cap B)=P(A) \cdot P(B \mid A)$

1. For two events $A$ and $B$, it is known that $P(A)=0.20, P(B)=0.40$ and $P(A \cup B)=0.50$. Find $P(A \cap B)$.
2. For two events $X$ and $Y$, it is known that $P(X)=2 / 5$ and $P(X \cap Y)=1 / 5$. Find $P(Y \mid X)$.
3. For two events $B$ and $C$, it is known that $P(C \mid B)=0.61$ and $P(C \cap B)=0.48$. Find $P(B)$.
4. Suppose that the probability of Eirik coming to a party is $80 \%$ and the probability of Emma coming to a party is $95 \%$. Assuming that these events are independent, what is the probability that they both will come to a party?
5. The probability of playing basketball is $12 \%$, and the probability of playing both basketball and football is $5 \%$. What is the probability of a person playing football, given they play basketball?
6. Joel and Rico play basketball. The probability that Joel makes a 3 pointer is $64 \%$. The probability that Rico makes a 3 pointer is $87.5 \%$. The probability of at least one of them making a 3 pointer is $95.5 \%$. What is the probability, as a percent, that both Joel and Rico will make a 3 pointer?
7. A bag contains 5 red, 3 green, 4 blue, and 8 yellow marbles. Find the probability of randomly selecting a green marble, and then a yellow marble if the first marble is replaced.
8. A sock drawer contains 5 pairs of each color socks: white, green and blue. What is the probability of randomly selecting a pair of blue socks, replacing it, and then randomly selecting a pair of white socks?
9. In a standard deck of cards, what is the probability of picking a diamond and then another diamond without replacement?
10. Randy has 4 pennies, 2 nickles, and 3 dimes in his pocket. If he randomly chooses 2 coins, what is the probability that they are both dimes if he doesn't replace the first one?

Check the following events and determine if they are independent.
11. $P(A)=0.45 \quad P(B)=0.30 \quad P(A \cap B)=0.75$
12. $P(A)=0.12 \quad P(B)=0.56 \quad P(A \cap B)=0.0672$
13. $P(A)=\frac{4}{5} \quad P(B)=\frac{3}{8} \quad P(A \cap B)=\frac{7}{40}$
14. $P(A)=\frac{7}{9} \quad P(B)=\frac{3}{4} \quad P(A \cap B)=\frac{7}{12}$

## Unit \#6 Review

In a bowl of marbles, there are 10 red ones, 6 green ones, and 8 blue ones.
$\qquad$ 1. If a marble is chosen at random from the bowl, find $P($ red one or a blue one)?
$\qquad$ 2. If two marbles are chosen at random with replacement, find $P($ red and a blue)?
3. If two marbles are chosen at random without replacement, find $P$ (they are both red)?

A person rolls two dice, one after the other.
4. $P$ (even sum) or $P(s u m$ of 9$)$
5. P (odd sum) or P (sum less than 5 )
6. What is the probability that the sum of two rolls is an even number given at least one of the rolls is a 4 ?

| + | 1 | 2 | 3 | 4 | 5 | 6 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |

A card is chosen from a standard deck of cards. The drawer is looking for clubs and face cards.

|  | Club | Not a Club |  |
| :---: | :---: | :---: | :---: |
| Face card | 3 | 9 |  |
| Not a face card | 10 | 30 |  |
|  |  |  |  |

## 7. Find $P($ Club $)$

8. Find P(Club | Not a Face Card)
9. Find P(Club $\cap$ Face Card)
10. Find $P($ Not a Club $\cup$ Not a Face Card)
11. Are the events Club and Not a Face Card Independent of each other?
12. In a Coordinate Algebra class, 22 students were male and 10 students were female. Out of those students, 11 of the guys and 4 of the girls passed the EOCT. If a person is chosen at random from the class, what is the probability of choosing a girl or a person that did NOT pass the EOCT?

|  | Pass | Not <br> Pass |  |
| :---: | :--- | :--- | :--- |
| Male |  |  |  |
| Female |  |  |  |
|  |  |  |  |

Of 500 athletes surveyed, 300 were male and 20 were left-handed. Only 8 of the left-handed athletes were female.
13. What is the probability that an athlete was male or was left-handed?

In a survey of 450 people, 200 of whom are female, it was found that 225 prefer chocolate ice cream including 99 males. Use this information to complete the table below.

|  | Males | Females |  |
| :---: | :---: | :---: | :---: |
| Vanilla |  |  |  |
| Chocolate |  |  |  |
|  |  |  | 450 |

Find the Probability:
14. The person likes chocolate.
15. The person likes vanilla, given they are male.
16. The person likes vanilla or is a female.
17. Are being a male and liking chocolate independent events?

Use the Venn diagram to find the following probabilities.
18. P(blonde hair)
19. P(blonde hair $\cap$ Boy)
20. P(Older than $8 \cup$ Boy)
21. P(Older than $8 \cup$ Boy)'

22. The probability of a randomly chosen boy playing basketball is 0.30 . The chance that a boy plays both basketball and football is 0.05 . The chance that a boy plays football is 0.25. What is the probability that a randomly chosen boy plays basketball or football?
23. Assume that the following events are dependent:

- The probability that a high school student eats breakfast is 0.8 .
- The probability that a high school senior will eat breakfast and get over 6 hours of sleep is 0.2.
What is the probability that a high school senior will get over 6 hours of sleep, given that the person ate breakfast?

