Probability Review #1

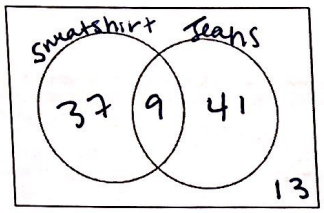
Name: Ms. Maher

1. Lesley estimates that she has a 75% chance of passing physics and an 80% chance of passing English. Assuming that "passing English" and "passing Physics" are independent events, what is the probability that Lesley will pass both of these two subjects?

$P(E \cap P) = P(E) \cdot P(P) = (.75)(.8) = .6$

60%

2. Out of a total of 100 students, 46 of them are wearing sweatshirts, 50 of them are wearing jeans, 9 of them are wearing both sweatshirts and jeans. There are 13 students that are wearing neither sweatshirts or jeans. Complete the venn diagram below using this information. Then, answer the following questions.



a. Jeans ∩ Sweatshirts = 9 (↓ intersect)

b. Jeans ∪ Sweatshirts = 87 (↑ union) $37+9+41$

3. If a satellite launch has a 97% chance of success, what is the probability of three consecutive successful launches?

$(.97)^3 = .913$ → 91.3%

4. In a survey at a football game, 50 of 75 male fans and 40 of 50 female fans said that they favor the new team mascot. If 1 male and 1 female are randomly selected, what is the probability that both favor the new mascot?

$\frac{50}{75} \cdot \frac{40}{50} = \frac{8}{15} = 53.3\%$

5. What is the probability on drawing a face card from a deck of cards or a diamond from a deck of cards?

J, K, Q → Union - Addition Rule

$\frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26} = 42.3\%$

6. Find the probability of selecting a club and then a spade with replacement.

$\frac{13}{52} \cdot \frac{13}{52} = .0625 = 6.25\%$

7. Find the probability of selecting a club and then a spade without replacement.

$\frac{13}{52} \cdot \frac{13}{51} = .064$ → 6.4%

12 total

J, K, Q ↓ 4

8. Find the probability of selecting a face card and then a 6 with replacement from a deck of cards.

$\frac{12}{52} \cdot \frac{4}{52} = .018$ → 1.8%

9. What is the probability of selecting a number 1-20 that is even or less than 12?

$\frac{10}{20} + \frac{11}{20} - \frac{5}{20} = \frac{16}{20} =$ 80%

10.

	Prefer Ketchup	Prefer Mustard	Totals
Prefer Hamburgers	24	31	55
Prefer Hot Dogs	33	49	82
Totals	57	80	137

Using the two- way table, find the following probabilities:

a. P(hot dogs and mustard) $49 | 137 = 35.8\%$

b. P(hamburgers | ketchup) $24 | 57 = 42.1\%$

c. P(mustard | hot dogs) $49 | 82 = 59.8\%$

d. P(ketchup) $57 | 137 = 41.6\%$

11. A regular 6-sided die is tossed. Find the probability of rolling a number less than 5 given that it is even.

$2 | 3 =$ 66.7%

2 4 6

12. Sean pulls two coins out on his pocket randomly without replacement. If his pocket contains one nickel, one dime, and one quarter, what is the probability that he randomly selects coins that add up to more than 20 cents? Justify your work by showing the sample space.

1 of each

D+Q = 35 ✓

N+D = 15 × N+Q = 30 ✓

2/3 → 66.7%

13. A poll finds that 72% of Jacksonville consider themselves football fans. If you randomly pick two people from the population of Jacksonville, what is the probability that the first and the second people are football fans?

$(.72)(.72) = .5184$

51.84%

14. Caden is drawing M&M's out of a packet. If there are 9 blue, 4 green, and 5 red M&M's, what is the probability of Caden drawing all 2 green in a row, then 1 red, then 2 more green in a row.

18 total

Assume w/o replacement

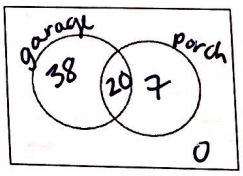
$\frac{4}{18} \cdot \frac{3}{17} \cdot \frac{5}{16} \cdot \frac{2}{15} \cdot \frac{1}{14} =$

$.00011167 = .011167$

.012%

Probability Review #2 Name: _____

1. There are 65 houses in the subdivision. Fifty-eight have a two car garage, 27 have a back porch, and 20 houses have both a two car garage and a back porch. Draw a Venn diagram for this situation and determine the following:
   a) How many houses have only a two car garage? 38
   b) How many houses have neither a garage nor a porch? 0



2. A sample of 250 residents of a local city were asked their opinion about raising taxes to finance new sidewalks. Some residents lived inside the city limits while others lived outside the city limits. The results are displayed below:

	In Favor	Opposed	
inside city limits	114	31	145
outside city limits	45	60	105
	159	91	250 total

   a) Find P(opposed) = 91/250 = 36.4%.
   b) Find P(opposed | outside city limits) 60/105 = 57.14%.
   c) Find P(outside city limits | opposed) 60/91 = 65.9%.

3. A pet store contains 35 light green parakeets (14 females and 21 males) and 44 sky blue parakeets (28 females and 16 males). Arrange this information in a two-way table.

	Male	Female	Total
Light Green Parakeet	21	14	35
Sky Blue Parakeet	16	28	44
Total	37	42	79

Union Add. Rule

Write your answer in reduced fraction form.
   a. What is the probability that a randomly chosen parakeet is male? 37/79
   b. You randomly choose one of the parakeets. What is the probability that it is a female or a sky blue parakeet? 42/79 + 44/79 − 28/79 = 58/79
   c. What is the probability that the randomly chosen parakeet is both green and male? 21/79
   d. What is the probability that the randomly chosen parakeet is female, given it is green? 14/35

Probability Review #2 20 total Name: _____

4. If you have a bag filled with 5 red marbles, 8 blue marbles, and 7 green marbles, what is the probability of:
   a. pulling out a blue marble given that the first marble was green? 8/19 = 42.1%.
   b. pulling two red marbles in a row without replacement?
   $\frac{5}{20} \cdot \frac{4}{19} = .053 = 5.3\%$.

5. What is the probability of choosing the ace of spades from a standard deck of cards given that the card you draw is a black card?
   26 black 1/26

6. Give three examples of events that are independent and explain why they are independent.
   coin & die, anything w/ replacement, card, & die . . .

7. State which events are independent and which are dependent.
   a) Tossing a coin and drawing a card from a deck Indep.
   b) Drawing a ball from a bag, not replacing it and drawing a second ball dep.
   c) Getting a raise in salary and purchasing a new car dep.
   d) Driving on ice and having an accident dep.
   e) Having a large shoe size and having a high IQ Indep.
   f) A father being left-handed and a daughter being left-handed dep.

8. Determine whether these events are mutually exclusive → do not happen at same time
   a) Roll a die: get an even number and get a number less than 3 no
   b) Roll a die: get a prime number and get an odd number no
   c) Roll a die: get a number greater than 3 and get a number less than 3 yes
   d) Select a student in the classroom: student has blond hair and blue eyes no
   e) Select a student at UNC: student is a sophomore and the student is a business major no
   f) Select any high school course: the course is calculus and the course is English II. yes

9. Blockbuster rented the following number of movie titles in each of these categories: 170 horror; 230 drama; 120 mystery, 310 romance, and 150 comedies. If a person who rented one of the movies is selected at random, find the probability that a romance or comedy was rented. 980 total
   [no overlap] $\frac{310}{980} + \frac{150}{980} = \frac{460}{480} = 46.94\%$.

10. In a statistics class there are 18 juniors and 10 seniors; 6 of the seniors are females and 12 of the juniors are males. If a student is selected at random, find the probability of selecting the following:
   a) P(a junior or a female) 18/28 + 12/28 − 6/28 = 24/28 = 85.7%.
   b) P(a senior or a female) 10/28 + 12/28 − 6/28 = 16/28 = 57.1%.
   c) P(a junior or a senior) 18/28 + 10/28 = 28/28 = 100%.

	J	S	
M	12	4	16
F	6	6	12
	18	10	28

Probability Review #2 Name: _____

11. If 37% of high school students said that they exercise regularly, find the probability that 5 randomly selected high school students will say that the exercise regularly.

$(.37)^5 = .0069$ .69 · 1.

12. If 25% of U.S. federal prison inmates are not U.S. citizens, find the probability that 2 randomly selected inmates will not be U.S. citizens.

$(.25)(.25) = .0625 = 6.25\%$

13. If 2 cards are selected from a standard deck of cards. The first card is placed back in the deck before the second card is drawn. Find the following probabilities: ~~back in the deck~~ replacement

a) P(Heart and club) $13/52 \cdot 13/52 = 6.25\%$.

b) P(2 Aces) $4/52 \cdot 4/52 = .59\%$.

c) P(Red card and 4 of spades) $26/52 \cdot 1/52 = .96\%$.

d) P(Queen of hearts and King) $1/52 \cdot 4/52 = .0015 = .15\%$

e) P(Spade and Ace of hearts) $13/52 \cdot 1/52 = .48\%$

f) P(2 of the same card) $1/52 \cdot 4/52 = .037\%$.

14. A bag contains 8 white marbles, 4 green marbles and 3 blue marbles. 2 marbles are selected at random without replacement, find the following probabilities: 15 total marbles

a) P(both are green) $4/15 \cdot 3/14 = 5.71\%$.

b) P(blue marble and white marble) $3/15 \cdot 8/14 = 11.43\%$.

c) P(white marble and green marble) $\frac{8}{15} \cdot \frac{4}{14} = 15.24\%$.

15. There are 20 crayons in a jar (3 red, 5 blue, 8 yellow, 4 green). Two are selected at random.

a. P(at least one red) without replacement

b. P(at least one red) with replacement

c. P(at most one blue) without replacement

d. P(at most one yellow) with replacement