Honors Algebra 2
Independent/Dependent Events
Warm-Up

Name: _____

Date: _____ Pd: ____

You are working with a deck of cards. The cards are blank on one side. 3 of the cards have a red star on the front. 4 of the cards have a blue square on the front. 2 of the cards have a green circle on the front. 5 of the cards have a purple triangle on the front. 6 of the cards have an orange diamond on the front. 20

1. Determine the probability of choosing a red star card. $\frac{3}{20}$

2. Suppose you put the card back and shuffled the cards. What is the probability you would pull a blue square card?

$\frac{4}{20} = \frac{1}{5}$

3. What is the probability of pulling a red star card, putting it back & shuffling, and then pulling a blue square card?

$\frac{3}{20} \cdot \frac{1}{5} = \frac{3}{100}$

4. You are working on your homework at home and your little sister is coloring near you. You pulled a green circle card from the deck. Before you could put it back, your sister grabbed it and started coloring all over the blank back side, making it unusable. What is the probability of pulling a purple triangle card now?

$\frac{5}{19}$

5. The above scenario is more often called ***without replacement*** as you are not putting the card back into the deck. With that in mind, what is the probability that you pull a green circle card and then a purple triangle card – without replacement?

$\frac{2}{20} \cdot \frac{5}{19} = \frac{2}{76} = \frac{1}{38}$

4

Test Review
HW: Print and redo test review

Review for Unit 5 Summative Probability
Honors Algebra 2

Name_____
Date_____ Period_____

1. There are six pennies in a jar of 10 coins. Four coins are randomly selected.
a) Determine the probability that all four coins are pennies if you replace each coin after selection. $\frac{6}{10} = \frac{3}{5}$ $\frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} = \frac{81}{625} = .1296$

b) Determine the probability that all four coins are pennies (without replacement). $\frac{6}{10} \cdot \frac{5}{9} \cdot \frac{4}{8} \cdot \frac{3}{7}$ $\frac{1}{14} = .0714$

2. A pollster surveys 100 subjects consisting of 45 democrats (30 of which are female) and 55 republicans (23 of which are female.)
a) Complete a two way to describe the data

	D	R	
F	30	23	53
M	15	32	47
	45	55	100

b) Find the following (2 each):
i) The probability that the subject is a female 53%.

ii) The probability of a democrat or a male $(45+32)/100 = 77/100 = 77\%$.

iii) The probability that the subject is a male republican $32/100 = 32\%$.

iv) The probability that a female is a democrat. $30/53 = .566$

3. I have one four section spinner numbered 1,2,3,4 and one coin. I spin the spinner and flip the coin. List the set of all possible outcomes for this chance experiment.

1H 2H 3H 4H
1T 2T 3T 4T

Determine the probabilities of the following compound events
a. The spinner shows a 3 and the coin lands on tails. $\frac{1}{8}$

b. The number on the spinner is greater than 2 and the spinner does not land on tails. $\frac{2}{8} = \frac{1}{4}$

c. Are the events "spin a spinner" and "flip a coin" independent of each other?

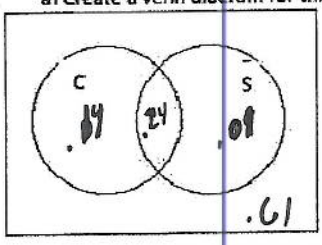
Yes, Independent, results of 1 does not influence other.

Test Review
HW: Print and redo test review

4. Researchers are interested in the relationship between cigarette smoking and lung cancer. Suppose and adult make is randomly selected from a particular population. The following table shows the probabilities of some events related to this chance process.

Event	Probability
Smokes	.25
Gets Cancer	.38
Does not Smoke and does not get Cancer	.61

a) Create a venn diagram for this situation:



b) Find the probability of smoking and getting cancer. 24%

c) Find the probability of smoking or getting cancer. 39%

d) If you are a smoker, find the probability of getting cancer. $\frac{.24}{.38} = .96$

e) Are the events "Smoking" and "Getting Cancer" independent of each other? NO

$P(S) \neq P(S|C)$ or $P(C) \neq P(C|S)$

$.25 \neq .63$ $.38 \neq .96$

5. The probability of eating pizza (event P) for dinner is .2. The probability of not having Thin Mints for dessert (event T) is .4. Ben is happy when we have pizza for dinner and Thin Mints for dessert.

a) Are the events P and T independent? (Hint: Is it possible to calculate P(P|T))?

Yes

b) What is the probability of having pizza and Thin Mints?

$(.2)(.6) = .12$

6. If $P(A) = 0.24$ and $P(B) = 0.52$ and A and B are independent, what is $P(A \text{ or } B)$?

$.24 + .52 - (.24 \times .52) = .6352$

Test Review
HW: Print and redo test review

7. In a recent survey, 100 students were asked for their gender and their class. If gender and class are independent, how many students would we expect to see in the cell labeled "x"?

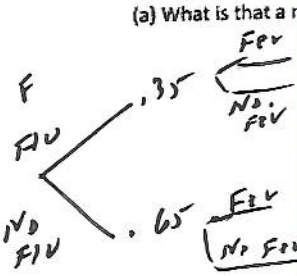
	Male	Female	
Freshman	x		30
Sophomore			25
Junior			24
Senior			21
	40	60	100

$\frac{x}{30} = \frac{40}{100}$

$x = 12$

8. Suppose your school is in the midst of a flu epidemic. The probability that a randomly-selected student has the flu is 0.35, and the probability that a student who has the flu also has a high fever is 0.90. But there are other illnesses making the rounds, and the probability that a student who doesn't have the flu does have a high fever is 0.12.

(a) What is that a randomly selected student at this school has a high fever?



$F \cap Fev = .315$

$F \cap Fev^c = .035$

$F^c \cap Fev = .078$

$F^c \cap Fev^c = .572$

$P(Fev) = .315 + .078$

$= .393$

or 39.3%

(b) Suppose a student walks into the nurse's office with a high fever. What is the probability that he or she has the flu?

$P(F|Fev)$

$\frac{31.5}{39.3} \approx 80.15\%$

	Fev	Fev^c	
F	31.5	3.5	35
F^c	7.8	57.2	65
	39.3	60.7	100

(c) At this school, are having the flu and having a high fever independent? Justify.

Dependant

$P(F) = 35\%$

$\neq$

$P(F|Fev) = \frac{31.5}{39.3} \approx 80.15\%$

Honors Algebra II
Probability Review

1) Consider the chance experiment where a 6 sided die is rolled and a coin is flipped. Consider the events:

1H 2H 3H 4H 5H 6H
1T 2T 3T 4T 5T 6T

A – the die shows a number 4
B - the coin shows heads

a) find $P(A \cup B)$ $\frac{7}{12}$

b) Does $P(A \cap B) = P(A) \cdot P(B)$? Why or why not? Yes, they are independent

c) find the probability the die shows an even number and the coin shows tails $\frac{3}{12} = \frac{1}{4}$

d) What is the probability for the event 'the coin shows heads and the die shows 5?
$\frac{1}{12}$

e) What is the probability for the event 'the die shows an odd number or the coin is heads'?
$\frac{9}{12} = \frac{3}{4}$

2) One hundred people were asked which of the two sports they preferred (hockey or basketball). The results are shown in the two-way table below:

	Hockey	Basketball	Total
Male	14	56	70
Female	6	24	30
Total	20	80	100

One person is selected at random. Determine the probability

a) $P(B^c)$ 20 %.

b) $P(B \cap F)$ $\frac{24}{100} =$ 24 %.

c) $P(H \cup M)$ = 76 %.

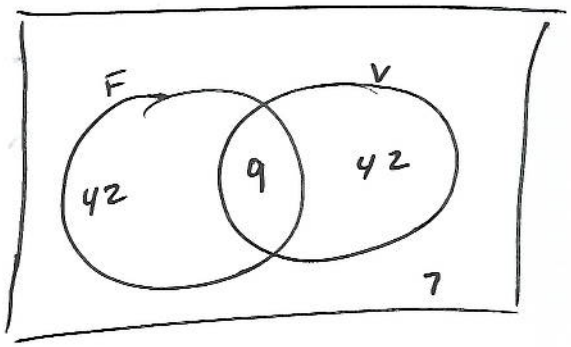
d) $P(H^c|F)$ $\frac{24}{30} =$ 80 %.

e) Are the preferred sport and gender independent events? Use what you know about conditional probabilities to justify your answer.

Yes, $P(H) = 20\%$. $P(M) = 70\%$.
$P(H|M) = 20\%$. or $P(M|H) = 70\%$.

3) The percentage of people who eat fruit (F) is 51%. The percentage of people who eat fruit (F) but not vegetables (V) is 42%. The percentage of people who don't eat fruit ~~or~~ and don't eat vegetables is 7%. Sketch a Venn Diagram using this information:

a)



c) A person is selected at random. Determine the probability of the following events:

d) the person eats fruit 51%.

e) the person does not eat fruit or vegetables 100 − 9 = 91%.

f) $P(F|V) = \frac{9}{51} = 17.6\%$.

g) $P(V|F) = \frac{9}{51} = 17.6\%$.

h) $P(F \cap V) = 9\%$.

4) Keith is interested in the upcoming two games played by his son's soccer team. He decided the probability of him winning the first game is .7 and the probability of him winning the second game is .5. What is the probability of his son's team winning both games?

.7 × .5 = .35 or 35%.

5) A bag contains 6 green, 5 blue and 12 orange marbles. If three marbles are picked without replacement, what is the probability that:

a) They are all three green $\frac{6}{23} \cdot \frac{5}{22} \cdot \frac{4}{21} = .01129$ or 1.13%.

b) The first is blue, and the next two are orange

$\frac{5}{23} \cdot \frac{12}{22} \cdot \frac{11}{21} = .0621$ or 6.21%.