Advanced Placement Statistics
Chapter 6 Review Sheet

Name: Mr. Morton
Date: _____ Period _____

If a single die is rolled one time, find the following:

1. P(4) $\frac{1}{6} = 0.1667 \Rightarrow 16.67\%$
2. P(even number) $\frac{1}{2} = 0.5 \Rightarrow 50\%$
3. P(a number greater than 4) $\frac{1}{3} = 0.3333 \Rightarrow 33.33\%$
4. P(a number less than 7) $1 \Rightarrow 100\%$
5. P(a number greater than 0) $1 \Rightarrow 100\%$
6. P(a number greater than 3 (or) an odd number) $\frac{5}{6} = 0.8333 \Rightarrow 83.33\%$
7. P(a number greater than 3 (and) an odd number) $\frac{1}{6} = 0.1667 \Rightarrow 16.67\%$

Anthony, Brenda, Celine, Daniel and Emily are math teachers at a high school. Their principal must choose two of them to attend a conference in Hawaii. To avoid unfairness the choice will be made by drawing two names from a hat.

8. Write down all possible choices of two of the five names. You may simply use the first letter of each of their names.

$_5C_2 = 10$ | AB AD BC BE CE | AC AE BD CD DE |

9. The random drawing makes all choices equally likely. What is the probability of each choice?

$1/10 = 0.10 \Rightarrow 10\%$

10. What is the probability that neither of the two men (Andrew and Dan) is chosen?

$3/10 = 0.30 \Rightarrow 30\%$

$2^3 = 8$

Stephen and Katie plan on having three children. Find the following probabilities.

11. P(all boys) $1/8 = 0.125 \Rightarrow 12.5\%$
12. P(all girls) $1/8 = 0.125 \Rightarrow 12.5\%$
13. P(two boys or two girls) $\frac{6}{8} = \frac{3}{4} = 0.75 \Rightarrow 75\%$
14. P(at least one child of each sex) $\frac{6}{8} = \frac{3}{4} = 0.75 \Rightarrow 75\%$

In statistics class there are 18 juniors and 10 seniors; 6 of the seniors are female, and 12 of the juniors are males. If a student is selected at random, find the probability of selecting:

15. P(a junior or a female) $\frac{18+12-6}{28} = \frac{6}{7} = 0.8571$
16. P(a senior or a female) $\frac{10+12-6}{28} = \frac{4}{7} = 0.5714$
17. P(a junior or a senior) $1 \Rightarrow 100\%$

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

18. Suppose that you have torn your ACL and are facing surgery to repair it. The orthopedic surgeon explains the risks to you. Infection occurs in 3% of such operations, the repair fails in 14% and both infection and failure occur together in 1%. What is the percent of these operations succeed and are free from infection?

$P(I) = .03$
$P(F) = .14$
$P(I \cap F) = .01$

$P(I \cup F) = .03 + .14 - .01 = 0.16$

$1 - 0.16 = 0.84 \Rightarrow \underline{84\%}$

19. Parking for students at Beacon High School is very limited, and those who arrive late must park illegally and take their chances at getting a ticket. Kristine has determined that the probability that she has to park illegally and that she gets a parking ticket is 0.07. She has kept data from last year and found that because of her perpetual tardiness, the probability that she will have to park illegally is 0.25. Suppose that she arrived late once again this morning and has to park in the no parking zone. Find the probability that Kris will get a parking ticket.

$$P(T|I) = \frac{P(T \cap I)}{P(I)}$$

$$= \frac{.07}{.25} = 0.28 \Rightarrow \underline{28\%}$$

20. Two cards dealt, one after the other, from a shuffled 52-card deck. Why is it wrong to say that the probability of getting two red cards is (1/2)(1/2)=1/4?

$$\left(\frac{26}{52}\right)\left(\frac{25}{51}\right) = \frac{25}{102} = 0.2451 \Rightarrow 24.51\%$$

In building new homes, a contractor finds that the probability of a homebuyer selecting a two-car garage of 0.70 and of selecting a one-car garage is 0.20. (Note that the builder will not build a three-car or larger garage.)

21. What is the probability that the buyer will select either a one-car or a two-car garage?

$0.90 \Rightarrow 90\%$

22. Find the probability that the buyer will select no garage.

$0.10 \Rightarrow 10\%$

23. Find the probability that the buyer will not want a two-car garage.

$0.30 \Rightarrow 30\%$

$P(2C) = 0.7$
$P(1C) = 0.2$
$P(NG) = 0.1$

Test Review
Part I (continued)

Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

6. What is meant by disjoint (mutually exclusive) events? Give an example of two disjoint events.

Cannot happen at the same time!

Event A: Getting an A in AP Statistics

Event B: Getting a B in AP Statistics

$P(A \cap B) = \{\emptyset\}$

7. Define and give an example of two complementary events.

Event A: Drawing a heart $\left(\frac{13}{52}\right)$

Event B: Not drawing a heart $\left(1 - \frac{13}{52}\right)$

When two dice are rolled, find the probability of getting

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

8. A sum greater than 9

$\frac{1}{6} = 0.1667 \Rightarrow 16.67\%$

9. A sum less than 4 or greater than 9

$\frac{1}{4} = 0.25 \Rightarrow 25\%$

A coin is tossed five times. $2^5 = 32$

10. Find the probability of getting at least one tail.

$\frac{31}{32} = 0.9685 \Rightarrow 96.85\%$

11. Find the probability of getting 4 tails.

HTTTT
THTTT
TTHTT
TTTHT
TTTTH

$\frac{5}{32} = 0.15625 \Rightarrow 15.63\%$

Suppose you are given a standard 6-sided die and told that the die is "loaded" in such a way that while the numbers 1, 3, 4, and 6 are equally likely to turn up, the numbers 2 and 5 are three times as likely to turn up as any of the other numbers.

12. The die is rolled once and the number turning up is observed. Use the information given above to fill in the following table:

Outcome	1	2	3	4	5	6
Probability	1/10	3/10	1/10	1/10	3/10	1/10

13. Let A be the event: the number rolled is a prime number (a number is prime if its only factors are 1 and the number itself; note that 1 is not prime). List the outcomes in A and find P(A).

$P(A) = \frac{7}{10} = 0.70 \Rightarrow 70\%$

14. Let B be the event: the number rolled is an even number. List the outcomes in B, and find P(B).

$P(B) = \frac{1}{2} = 0.50 \Rightarrow 50\%$

15. Are events A and B disjoint? Explain briefly.

No, 2 in common!

16. Determine if events A and B are independent.

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

$0.3 \neq (0.7)(0.5)$

$0.3 \neq 0.35$

NO!

$P(A|B) \neq P(A)$

$\frac{P(A \cap B)}{P(B)} \neq P(A)$

$\frac{0.3}{0.5} \neq 0.7$

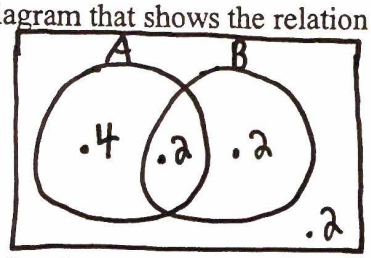
$0.6 \neq 0.7$

Consolidated Builders has bid on two large construction contracts. The company president believes that the probability of winning the first contract (event A) is 0.6, that the probability of winning a second (event B) is 0.4, and that the probability of winning both jobs is 0.2.

17. What is the probability of the event {A or B} that Consolidated will win at least one of the jobs?

$$P(A \cup B) = 0.6 + 0.4 - 0.2$$
$$= 0.8 \Rightarrow 80\%$$

18. Draw a Venn diagram that shows the relation between the events A and B in Exercise 17.



Write each of the following events in terms of A, B, A^c, and B^c. Indicate the events on your diagram for 18, and use the information in (17) to calculate the probability of each.

19. Consolidated wins both jobs.

$$P(A \cap B) = 0.2 \Rightarrow 20\%$$

20. Consolidated wins the first job but not the second.

$$P(A \cap B^c) = 0.4 \Rightarrow 40\%$$

21. Consolidated does not win the first job but does win the second.

$$P(A^c \cap B) = 0.2 \Rightarrow 20\%$$

22. Consolidated does not win either job.

$$P(A^c \cap B^c) = 0.2 \Rightarrow 20\%$$

Test Review Part II

AP Statistics

Directions: *Work on these sheets.*

Part 1: Multiple Choice. *Circle the letter corresponding to the best answer.*

1. Which of the following pairs of events are disjoint (mutually exclusive)?
   (a) A: the odd numbers; B: the number 5
   (b) A: the even numbers; B: the numbers greater than 10
   (c) A: the numbers less than 5; B: all negative numbers
   (d) A: the numbers above 100; B: the numbers less than –200
   (e) A: negative numbers; B: odd numbers

2. Which of the following are true?
   I. The sum of the probabilities in a probability distribution can be any number between 0 and 1.
   II. The probability of the union of two events is the sum of the probabilities of those events.
   III. The probability that an event happens is equal to 1 – (the probability that the event does not happen).
   (a) I and II only
   (b) I and III only
   (c) II and III only
   (d) I, II, and III
   (e) None of the above gives the complete set of true responses

3. Government data show that 26% of the civilian labor force has at least 4 years of college and that 15% of the labor force works as laborers or operators of machines or vehicles. Can you conclude that because (0.26)(0.15) = .039 about 4% of the labor force are college-educated laborers or operators?
   (a) Yes, by the multiplication rule
   (b) Yes, by conditional probabilities
   (c) Yes, by the law of large numbers
   (d) No, because the events are not independent
   (e) No, because the events are not mutually exclusive

4. If a peanut M&M is chosen at random, the chances of it being of a particular color are shown in the table below.

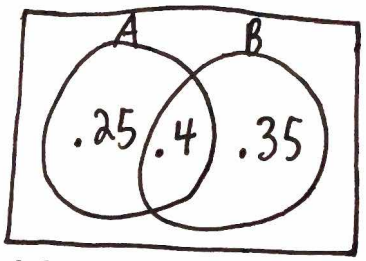
Color	Brown	Red	Yellow	Green	Orange	Blue
Probability	.3	.2	.2	.2	.1	.0

   The probability of randomly drawing a blue peanut M&M is
   (a) 0.1
   (b) 0.2
   (c) 0.3
   (d) 1.0
   (e) According to this distribution, it's impossible to draw a blue peanut M&M.

$P(A \cap B^c) = 0.25$ $P(A) = 0.65$

5. If $A \cup B = S$ (sample space), $P(A \text{ and } B^c) = 0.25$, and $P(A^c) = 0.35$, then $P(B) =$

(a) 0.35
(b) 0.4
(c) 0.65
(d) 0.75
(e) None of the above. The answer is _____.



Part 2: Free Response

Answer completely, but be concise. Write sequentially and show all steps.

A box contains six red tags numbered 1 through 6, and four white tags numbered 1 through 4. One tag is drawn at random.

6. Write the sample space for this experiment.

$S = \{R1, R2, R3, R4, R5, R6, W1, W2, W3, W4\}$

Calculate the following probabilities:

7. P(red) $\frac{6}{10} = \frac{3}{5} = 0.6$

8. P(even number) $\frac{5}{10} = \frac{1}{2} = 0.5$

9. P(red and even) $\frac{3}{10} = 0.3$

10. P(red or even) $\frac{6+5-3}{10} = \frac{4}{5} = 0.8$

11. P(neither red nor even) $\frac{2}{10} = \frac{1}{5} = 0.2$

12. P(even | red) $\frac{3}{6} = \frac{1}{2} = 0.5$

13. P(red | even) $\frac{3}{5} = 0.6$

14. P(<4 | odd) $\frac{4}{5} = 0.8$

15. Suppose that for a group of consumers, the probability of eating pretzels is .75 and that the probability of drinking Coke is .65. Further suppose that the probability of eating pretzels *and* drinking Coke is .55. Determine if these two events are *independent*.

$$P(P|C) = \frac{P(P \cap C)}{P(C)} = P(P)$$

$$= \frac{0.55}{0.65} = 0.8462 \neq 0.75$$

Consider the following experiment: The letters in the word AARDVARK are printed on square pieces of tagboard (same size squares)with one letter per card. The eight letter cards are then placed in a hat, and one letter card is randomly chosen (without looking) from the hat.

16. List the sample space S of all possible outcomes.

$S = \{A, D, K, R, V\}$

17. Make a table that shows the set of outcomes (X) and the probability of each outcome:

Outcomes	A	D	K	R	V
P(X)	3/8	1/8	1/8	2/8 (1/4)	1/8

18. Consider the following events:

V: the letter chosen is a vowel.
F: the letter chosen falls in the first half of the alphabet (i.e., between A and M).

List the outcomes in each of the following events, and determine their probabilities:

V = {A} P(V) = 3/8 = 0.375

F = {A, D, K} P(F) = 5/8 = 0.625

V or F = {A, D, K} P(V or F) = 5/8 = 0.625

complement of F = {R, V} $P(F^c)$ = 3/8 = 0.375

19. Determine if the events V and F are independent.

$P(V|F) = P(V)$

$\frac{P(V \cap F)}{P(F)} = P(V)$

$\frac{0.375}{0.625} \neq 0.375$

$0.6 \neq 0.375$

$P(V \cap F) = P(V) \cdot P(F)$

$0.375 \neq (0.375)(0.625)$

$0.375 \neq 0.2344$

No!