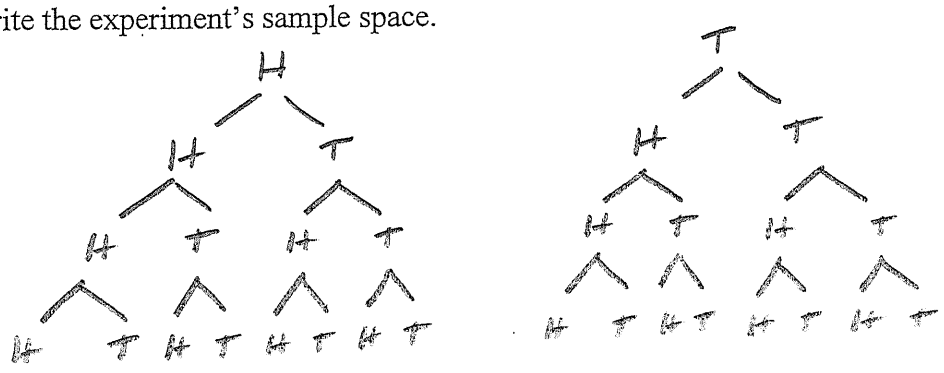
CHAPTER 6 STATION REVIEW 1

1) Consider an experiment in which a coin is tossed 4 times. $2^4 = 16$ outcomes

a) Write the experiment's sample space.



b) What is the probability of exactly 4 heads showing up? HHHH

$\frac{1}{16} = 0.0625 = 6.25\%$

c) What is the probability of exactly 1 head showing up?

HTTT
THTT
TTHT
TTTH

$\frac{4}{16} = \frac{1}{4} = 0.25 = 25\%$

d) What is the probability of at least 1 tail showing up?

Complement → no tail → HHHH → $\frac{1}{16}$) $\Rightarrow \frac{15}{16}$

have at least 1 tail

$\frac{15}{16} = 0.9375 = 93.75\%$

CHAPTER 6 STATION REVIEW 2

2) A particular location has an 8% chance of snow on any day regardless of whether or not it snowed the previous day. 8% snow 92% no snow

a) What is the probability of 2 consecutive days with snow?

$(0.08)(0.08) = 0.0064 = 0.64\%$

b) What is the probability of 2 consecutive days without snow?

$(0.92)(0.92) = 0.8464 = 84.64\%$

3) Volleyball

a) How many different ways can the starting 6 on a volleyball team line up in a row?

$6P6 = 6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 720$

b) How many different ways can the starting 6 on a volleyball team line up in a row if the first 3 must be the Captains of the team?

$3 \cdot 2 \cdot 1 \quad 3 \cdot 2 \cdot 1 = 36$

(3 · 2 · 1: must be the 3 Captains; 3 · 2 · 1: non-captains)

4) Sally has 3 pants, 6 shirts and 2 pairs of shoes packed for a business trip. How many different outfits can she make?

$3 \cdot 6 \cdot 2 = 36$

CHAPTER 6 STATION REVIEW 3

5) If A and B are two events in an experiment where P(B) = 0.7 and $P(A \cap B) = 0.2$, find $P(A \mid B)$.

$$\frac{P(A \cap B)}{P(B)} = \frac{0.2}{0.7} = 0.29 = 29\%$$

6) A pair of fair 6-sided dice is tossed. Let A = {the sum is 7} and B = {4 appears on either die}. $6 \cdot 6 = 36$ outcomes

a) Find $P(B \mid A)$

$$\frac{P(B \cap A)}{P(A)} = \frac{\frac{2}{36} \cdot \frac{36}{6}}{\frac{6}{36}}$$

$$= \frac{2}{6}$$

$$= \frac{1}{3}$$

b) Find $P(A \mid B)$

$$\frac{P(A \cap B)}{P(B)} = \frac{\frac{2}{36} \cdot \frac{36}{11}}{\frac{11}{36}}$$

$$= \frac{2}{11}$$

A	B
(1,6)	(4,1)
(2,5)	(4,2)
(3,4)	(4,3)
(4,3)	(4,4)
(5,2)	(4,5)
(6,1)	(4,6)
	(6,4)
	(5,4)
	(3,4)
	(2,4)
	(1,4)

7) What is the probability that you guess correctly on all of the questions if there are 4 true/false questions and 6 multiple choice questions with 4 choices each?

$$\frac{1}{2^4 \cdot 4^6} = \frac{1}{65,536} = 1.53 \times 10^{-5}$$

$$= 0.00153\%$$

CHAPTER 6 STATION REVIEW 4

8) The table below shows Mrs. Ketterhagen's Pre-Calculus classes during first semester of the 2017/18 school year.

	Juniors	Seniors	
Period 2	7	8	15
Period 5	13	16	29
Period 6	6	9	15
	26	33	59

a) What percent of all Pre-Calculus students are seniors?

$\frac{33}{59} = 55.9\%$

b) What percent of Period 5 Pre-Calculus students are juniors?

$\frac{13}{29} = 44.8\%$

9) Consider the word BURLINGTON.

10 Letters

a) How many three-letter permutations can be made from the word BURLINGTON?

$_{10}P_3 = 720$

$10 \cdot 9 \cdot 8$

b) How many three-letter permutations can be made from the word BURLINGTON which contain no T?

9 Letters Left

$_9P_3 = 504$

$9 \cdot 8 \cdot 7$

CHAPTER 6 STATION REVIEW 5

10) Consider the experiment selecting a color using a spinner labeled Red, Blue, and Yellow and tossing a 6-sided die. $6 \cdot 3 = 18$

a) Write the sample space for this experiment.

$\{(R,1)\ (R,2)\ (R,3)\ (R,4)\ (R,5)\ (R,6)$
$(B,1)\ (B,2)\ (B,3)\ (B,4)\ (B,5)\ (B,6)$
$(Y,1)\ (Y,2)\ (Y,3)\ (Y,4)\ (Y,5)\ (Y,6)\}$

b) List the outcomes for the event "the number is even".

$\{(R,2)\ (R,4)\ (R,6)$
$(B,2)\ (B,4)\ (B,6)$
$(Y,2)\ (Y,4),\ (Y,6)\}$

11) Permutations

a) Evaluate ${}_8P_5$. Show formula.

$$\frac{8!}{(8-5)!} = \frac{8!}{3!} = \frac{40{,}320}{6}$$

$$= 6720$$

b) What is meant by ${}_8P_5$?

- Picking 5 objects from 8
- Arrangements of 8 objects, 5 at a time.

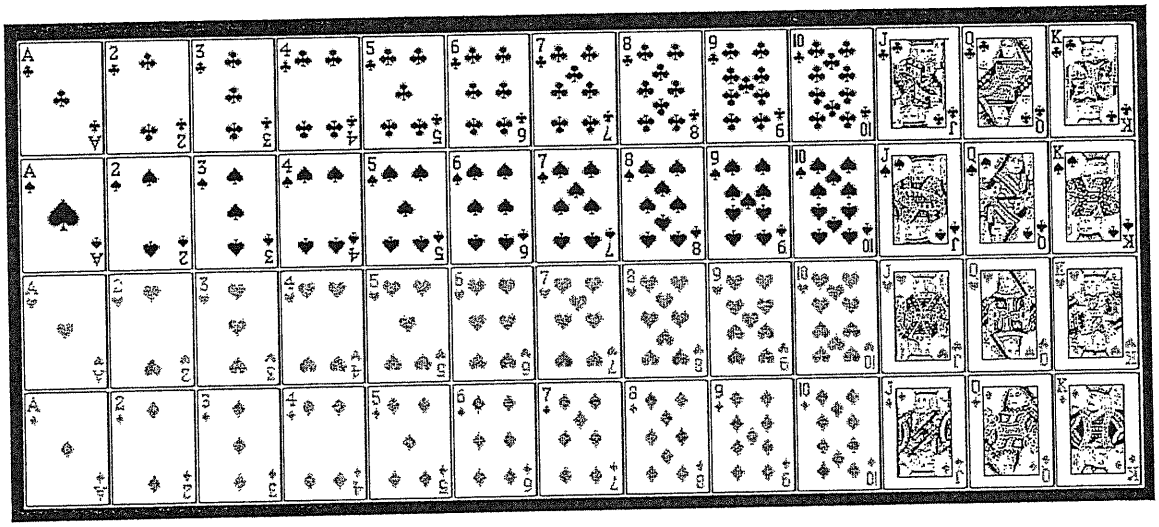
12) In how many ways can the 11 soccer players earn the award of MVP, Best Offense, and Best Defense

$$\underline{11} \cdot \underline{10} \cdot \underline{9} = 990$$

$${}_{11}P_3$$

CHAPTER 6 STATION REVIEW 6

13) Use the deck of cards to answer the following questions. A face card is a jack, queen and king.



http://www.milefoot.com/math/discrete/counting/images/cards.png

a) Find the probability that the card drawn will be a red card or a black card. → no overlap mutually exclusive

$P(R) + P(B)$

$\frac{26}{52} + \frac{26}{52} = \frac{52}{52} = 1$

b) Find the probability that the card drawn will be a heart or a face card.

$P(H) + P(F) - P(\text{Both})$

$\frac{13}{52} + \frac{12}{52} - \frac{3}{52} = \frac{22}{52}$

c) Find the probability that the card drawn will be an Ace or Jack.

$P(A) + P(J)$

$\frac{4}{52} + \frac{4}{52} = \frac{8}{52}$

d) If Ace is low, what is the probability that the card drawn will be less than ten?

$\frac{36}{52}$

CHAPTER 6 STATION REVIEW 7

14) Polygraph machines attempt to detect whether a statement is a lie. In a lie detector test, a positive result means that a statement is detected as a lie. The most favorable estimates give a 90% rate of detecting lies with 95% of truthful statements "passing" (not marked as lies). If the test is used when the probability of a lie occurring is 40%, what is the likelihood a positive result is a false positive?

a) Fill in the contingency table with numbers for this situation:

	Lying 40%	Not Lying 60%
Positive (lie)	90%	5%
Negative (not lie)	10%	95%
Total	100%	100%

b) Find the P (false positive | positive test)

$$\frac{P(\text{Both})}{P(\text{given})} = \frac{P(\text{False + and positive})}{P(\text{Positive})} = \frac{(0.05)(0.6)}{(.1)(.4)+(.6)(.05)}$$

$$= \frac{0.03}{0.39}$$

$$= 0.0769$$

$$= 7.69\%$$