

MA 110 WORKSHEET (8.2) "EXTRA WORKSHEET 1"

Name _____

1. A bag contains 40 marbles. Seven marbles are purple, eleven are pink, and twenty-two are green.
 - A. A marble is selected at random, what is the probability that it is purple?
 - B. Two marbles are selected one after the other without replacement, what is the probability that they are both purple?
 - C. Four marbles are selected at random one after the other without replacement, what is the probability that they are all purple?
 - D. Recall there are 40 marbles in all, how many ways could a combination of 4 marbles be selected?
 - E. There are seven purple marbles, how many ways could a combination of 4 purple marbles be selected?

F. From the application of the formula $C_{n,r} = \frac{n!}{(n-r)!r!}$,

$$C_{7,4} = \frac{7!}{7-4!4!} = \frac{7!}{3!4!} = \frac{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{7 \cdot 6 \cdot 5 \cdot 4}{4 \cdot 3 \cdot 2 \cdot 1}$$

$$\text{and } C_{40,4} = \frac{40!}{40-4!4!} = \frac{40!}{36!4!} = \frac{40 \cdot 39 \cdot 38 \cdot 37 \cdot 36!}{36! \cdot 4 \cdot 3 \cdot 2 \cdot 1} = \frac{40 \cdot 39 \cdot 38 \cdot 37}{4 \cdot 3 \cdot 2 \cdot 1}$$

$$\text{Thus, } \frac{C_{7,4}}{C_{40,4}} = \frac{\frac{7 \cdot 6 \cdot 5 \cdot 4}{4 \cdot 3 \cdot 2 \cdot 1}}{\frac{40 \cdot 39 \cdot 38 \cdot 37}{4 \cdot 3 \cdot 2 \cdot 1}} = \frac{7 \cdot 6 \cdot 5 \cdot 4}{40 \cdot 39 \cdot 38 \cdot 37} = \frac{7}{40} \cdot \frac{6}{39} \cdot \frac{5}{38} \cdot \frac{4}{37}$$

- G. If seven marbles are selected at random one after the other without replacement, what is the probability that they are all purple?
- H. If ten marbles are selected at random one after the other without replacement, what is the probability that three are purple and seven are green?
- I. Three marbles are selected one after the other without replacement, what is the probability that they are all purple?
- J. Three marbles are selected one after the other without replacement, what is the probability that exactly two are purple?
- K. Three marbles are selected one after the other without replacement, what is the probability that at least two are purple?

2. A small college has 30 faculty members, eight from business, six from education, nine from science, and seven from math. From this group of faculty, a committee of three people will be chosen at random. What is the probability that this committee will contain
- A. only faculty from science?
 - B. no people from education?
 - C. Suppose a larger committee of ten faculty is chosen. What is the probability that five are from education and five are from math?
3. A bag contains 40 marbles. Seven marbles are purple, eleven are pink, and twenty-two are green.
- A. A marble is selected at random, what is the probability that it is green?
 - B. Two marbles are selected one after the other with replacement, what is the probability that they are both green?
 - C. Ten marbles are selected one after the other with replacement, what is the probability that they are all green?
 - D. Ten marbles are selected one after the other with replacement, what is the probability that seven are green?