*AAT (IC/HW)-Day 1 Name Key

Chapter 10: 10-7 Distinguishable Permutations & Combinations Date: _____ Period: _____

**Find the number.**

1. C(7, 3)

$\frac{7!}{4!3!} = 35$

2. C(9, 8)

$\frac{9!}{1!8!} = 9$

3. C(n, n – 1)

$\frac{n!}{(n-(n-1))!(n-1)!} = \frac{n!}{1!(n-1)!} = \frac{n(n-1)!}{(n-1)!} = n$

4. C(7, 0)

$\frac{7!}{7!0!} = 1$

**Find the number of possible color arrangements for the 12 given disks, arranged in a row.**

5. 5 black, 3 red, 2 white, 2 green

$\frac{12!}{5!3!2!2!} = 166,320$

6. Ten people wish to play in a basketball game. In how many different ways can two teams of five players be formed?

$C(10,5) \cdot C(5,5)$

$= 252$

7. Consider any eight points such that no three are collinear. How many lines are determined?

2 pts. determine a line

$C(8,2) = 28$

8. A student has five math books, four history books, and eight fiction books. In how many different ways can they be arranged on a shelf if books in the same category are kept next to one another?

$(5! \cdot 4! \cdot 8!)3! = 696,729,600$

4 order the categories

$3 \cdot C(10,2) \cdot C(8,2) \cdot C(4,2) \cdot C(6,2) \cdot 3 \cdot 4 = 4,082,400$

9. A football squad consists of three centers, ten linemen who can play either guard or tackle, three quarterbacks, six halfbacks, four ends, and four fullbacks. A team must have one center, two guards, two tackles, two ends, two halfbacks, a quarterback, and a fullback. In how many different ways can a team be selected from the squad?

1 center; $C(3,1)$
2 guards; $C(10,2)$
2 tackles (from 8 remaining linemen); $C(8,2)$
2 ends; $C(4,2)$
2 half-backs; $C(6,2)$
1 qb; $C(3,1)$
1 fullback; $C(4,1)$

10. A committee of 3 men and 2 women is to be chosen from a group of 12 men and 8 women. Determine the number of different ways of selecting the committee.

$C(12,3) \cdot C(8,2)$
$= 6160$

11. To win a state lottery game, a player must correctly select six numbers from the numbers 1 – 49.

(a) Find the total number of selections possible.

$C(49,6) =$
$13,983,816$

(b) Work part (a) if a player selects only even numbers.

$C(24,6) =$
$134,596$

12. In a round-robin tennis tournament, every player meets every other player exactly once. How many players can participate in a tournament of 45 matches?

$C(n,2) = 45$

$\frac{n!}{(n-2)!\,2!} = 45$

$\frac{n(n-1)(n-2)!}{(n-2)!\,2!} = 45$; $\frac{n^2-n}{2} = 45$

$n^2 - n - 90 = 0$
$(n-10)(n+9) = 0$
$n = 10$ $n = -9$

13. The winner of the seven-game NBA championship series is the team that wins four games. In how many different ways can the series be extended to seven games?

$C(6,3) = 20$

* Each team must win 3 of first 6 games to be extended to 7th.

14. An ice cream parlor stocks 31 different flavors and advertises that it serves almost 4500 different triple scoop cones, with each scoop being a different flavor. How was this number obtained?

$C(31, 3) = 4495$

3 flavors & scoops

15. A fast food restaurant advertises that it offers any combination of eight condiments on a hamburger, thus giving a customer 256 choices. How was this number obtained?

* each condiment is either yes or no

$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

$= 2^8 = 256$