Algebra 2 | **Final Exam Review: Chapter 15** | **Mrs. Dunphy**

Name: Key | **Your score:** _____

Sections 15-5 & 15-6

Solve each problem related to the fundamental counting principles and permutations.

1. Suppose you own 6 different shirts, 3 pairs of pants, and 4 pairs of shoes. How many unique outfits consisting of a shirt, pants, and shoes are possible?

$6 \cdot 3 \cdot 4 = 72$

2. A combination lock can be opened when 4 different dials are placed on the correct digits, each numbered 0 through 9. How many lock combinations are possible?

$10 \cdot 10 \cdot 10 \cdot 10 = 10{,}000$

3. How many positive integers less than 100 can be represented by the digits 1, 3, 7, and 9?

1 or 2 digits

$4 = 4$

$4 \cdot 4 = 16$

$4 + 16 = 20$

4. Suppose there are 13 players on a baseball team. In a lineup, there are three outfielders, four infielders, and a pitcher/catcher pair.

(A) How many different outfields can be made?

$_{13}C_3 = \frac{13!}{3!10!} = 286$

(B) How many different infields can be made?

$_{13}C_4 \quad \frac{13!}{4!9!} \quad 715$

(C) How many different pitcher/catcher pairs?

$_{13}C_2 \quad \frac{13!}{2!11!} = 78$

5. Find the number of arrangements of the letters in each word.

(A) CABBAGE

$\frac{7!}{2!2!} = 1260$

A B

(B) FOOLPROOF

$\frac{9!}{2!4!} = 7560$

F O

(C) SCOTTSDALE

$\frac{10!}{2!2!} = 907{,}200$

S T

Section 15-7

Solve each problem related to combinations.

6. For the set {A, B, C, D, E}, write all 3-letter subsets.

{ABC} {ACD} {BCE} {CDE}
{ABD} {ACE} {BCD}
{ABE} {ADE} {BDE}

7. Calculate the number of three letter subsets from the previous problem using the formula for combinations. Do you get the same number?

$_5C_3 = \frac{5!}{2!3!} = \frac{5 \cdot 4 \cdot 3!}{2 \cdot 3!} = 10$

yes!

8. How many combinations of the letters in RAINBOWS can you make taking them 7 at a time? 5 at a time? 4 at a time?

$_8C_7 = \frac{8!}{1!7!} = 8$

$_8C_5 = \frac{8!}{3!5!} = 56$

$_8C_4 = \frac{8!}{4!4!} = 70$

9. In a class of 30 students, in how many ways can you select a committee of 3 students?

$_{30}C_3 = \frac{30!}{3!27!} = 4060$

10. In a class of 25 students there are 12 boys and 13 girls. In how many ways can a team of 6 students be chosen so that there are an equal number of boys and girls?

$_{12}C_3 \cdot {}_{13}C_3$

$220 \cdot 286 = 62{,}920$

11. A girls' softball team must field at least 8 players, but no more than 10. How many possible teams can be created from 14 girls?

8 $_{14}C_8 = 3003$

\+

9 $_{14}C_9 = 2002$

\+

10 $_{14}C_{10} = 1001$

6006

Sections 15-8 & 15-9

Solve the problems related to events, sample spaces, and probability.

12. A letter is drawn at random from the word COTANGENT. Specify each event and find its probability. 6 consonants, 3 vowels

(A) The letter is a consonant. $\frac{6}{9} = \frac{2}{3}$

(B) The letter is a vowel. $\frac{3}{9} = \frac{1}{3}$

(C) The letter is from the first half of the alphabet. A–M → C, A, G, E $\frac{4}{9}$

(D) The letter is used in the spelling of TANGENT. 7 letters $\frac{7}{9}$

13. A bag of marbles contain 1 blue, 2 white, 3 red, and 6 yellow marbles. One marble is selected at random. Find the probability of each event.

(A) It is not blue. $\frac{11}{12}$

(B) It is not green. all $\frac{12}{12} = 1$

(C) It is blue or yellow. $1+6=7$ $\frac{7}{12}$

(D) It is red and blue. 0 not possible

14. Four identical coins are tossed at the same time. Find the probability of each event. $2 \cdot 2 \cdot 2 \cdot 2 = 16$ outcomes

(A) All are heads. HHHH $\frac{1}{16}$

(B) Two are heads and two are tails. $\frac{{}_4C_2}{16} = \frac{6}{16} = \frac{3}{8}$

(C) At least three are tails

3T: $\frac{{}_4C_3}{16} = \frac{4}{16} = \frac{1}{4}$

4T: $\frac{1}{16}$ $\frac{1}{16} + \frac{4}{16} = \frac{5}{16}$

15. Two dice are rolled at the same time. Find the probability of each event.

(A) The sum of the numbers is 10. (5,5) (4,6) (6,4)

$\frac{3}{36} = \frac{1}{12}$

(B) The sum is at least 10.

10: (5,5)(4,6)(6,4)

11: (6,5)(5,6)

12: (6,6)

} 6 ways

$\frac{6}{36} = \frac{1}{6}$