Math 3201
Test 2
Unit 2 -Counting Methods

$${}_nP_r = \frac{n!}{(n-r)!} \qquad {}_nC_r = \binom{n}{r} = \frac{n!}{(n-r)!r!}$$

Name:_____

Multiple Choice
Identify the choice that best completes the statement or answers the question. {2 marks each}

____ **1.** The lunch special at a sandwich bar offers you a choice of 8 sandwiches, 4 salads, 5 drinks, and 3 desserts. How many different meals are possible if you choose one item from each category?

A) 360
B) 380
C) 420
D) 480

____ **2.** A license plate arrangement consists of 3 letters and 3 numbers. How many license plates arrangements are possible if no letters or numbers (0 to 9) are repeated?

A) 11 232 000
B) 12 654 720
C) 15 600 000
D) 17 576 000

____ **3.** Angie will draw one card from a standard deck of playing cards. How many ways can she choose a queen or a black card?

A) 4
B) 26
C) 28
D) 30

____ **4.** A student incorrectly wrote 6! = 120. To produce a correct solution for 6!, what operation should be applied to 120.

A) Add 6
B) divide by 6
C) multiply by 6
D) subtract 6

____ **5.** Simplify: $\frac{(n-3)!}{(n-5)!}$

A) $\frac{1}{n^2-7n+12}$

B) $\frac{1}{n^2-9n+20}$

C) $n^2 - 7n + 12$
D) $n^2 - 9n + 20$

____ **6.** Solve for *n*, where $n \in$ N.
$\frac{(n-2)!}{(n-3)!} = 15$

A) 13
B) 15
C) 17
D) 18

____ **7.** How many arrangements of four digit numbers can be made using the numbers 2 through 9 if no numbers can be repeated?

A) 336
B) 504
C) 1680
D) 40 320

____ **8.** How many different arrangements can be made using all the letters in Calgary if the first letter must be G.?

A) 120
B) 360
C) 2520
D) 5040

____ **9.** How many ways can Krystal, Emily, Maverick, Caleb, Nathan, Blair and Stephen stand in a line if Krystal and Emily must stand together?

A) 2!5!
B) 6!
C) 2!6!
D) 7!

____ **10.** Norm bought 3 chocolate chip cookies, 2 peanut butter cookies and 4 oatmeal cookies from the corner bakery to give to his 9 grandchildren. How many ways can he distribute 1 cookie to each grandchild?

A) $\frac{9!}{2!3!4!}$

B) $\frac{2!3!4!}{9!}$

C) 2!3!4!

D) 9!

____ **11.** There are 14 students on the student council. How may ways can 7 of them be chosen to serve on the dance committee?

A) 1147
B) 1716
C) 3432
D) 17 297 280

____ **12.** Which of the following is equivalent to ${}_{50}C_{45}$?

A) $\binom{50}{55}$

B) $\binom{50}{5}$

C) $\frac{50!}{45!}$

D) $\frac{50!}{5!}$

____ **13.** Solve for n

${}_{n+1}P_{1} = 72$

A) $n = 70$
B) $n = 71$
C) $n = 72$
D) $n = 73$

____ **14.** Identify the term that best describes the following situation:
"Determine the number of pizzas with 4 toppings from a list of 40 toppings."

A) Combinations
B) Factorial
C) Fundamental counting principle
D) permutations

____ **15.** A committee consists of 6 men and 4 women. How many committees can be formed from 12 men and 15 women.

A) ${}_{12}C_6 + {}_{15}C_4$
B) ${}_{12}C_6 \times {}_{15}C_4$
C) ${}_{12}P_6 + {}_{15}P_4$
D) ${}_{12}P_6 \times {}_{15}P_6$

Constructed Response – Answer all questions and **show all workings**.

1 Simplify fully by showing all your workings. {3}

$$\frac{320!}{317!5!}$$

2 Either: Solve for n, $n \in N$: $\frac{3(n+1)!}{(n-1)!} = 126$ {6}

3 John, Nathan, Madison, Steve, Carter, Michael, Jason, and Victoria are to be arranged in a line. How many ways can they be arranged if

A) there are no restrictions. {1}

B) Steve, Carter, and Michael must be always together. {3}

C) Madison and Victoria **cannot** be side by side? {4}

4. How many one-letter, two-letter or three-letter words can be formed from the word PENCIL? {8}

5. A committee of 5 people is to be formed from a group of 10 boys and 12 girls.

A) How many committees are possible if there must be 1 boy and 4 girls on the committee? {3}

B) How many possible committees can be formed if there are **at most** 2 boys on the committee? {10}