Quiz 3B
Counting

Name_____

ID_____No._____

ONLY THE ANSWERS IN THE ANSWER SHEET WILL BE GRADED.

COUNTING

1. There are 3 sections in a question paper and each section contains 4 questions. A candidate has to answer a total of 5 questions, choosing at least one question from each section. Then find the number of ways in which the candidate can choose the questions.
   a. 624
   b. 642
   c. 620
   d. 644

2. Find the total number of ways in which all 6 balls of different colors can be distributed among 2 people.
   a. 1
   b. 15
   c. 36
   d. 64

3. A bag contains beads of three colors: black, gray, and white. What is the smallest number of beads which must be drawn from the bag, without looking so that among these beads, two are of the same color?
   a. 2
   b. 3
   c. 4
   d. 5

4. Find the total number of six-digit numbers in which all digits are odd, and all 1, 3, 5, 7, and 9 must appear in that number.
   a. 3,600
   b. 1,800
   c. 900
   d. 720

5. Given $C(n+1,k) = C(n,k-1) + C(n,k)$
   Which of the following problems can prove that this equation is true?
   a. The number of all subsets of set A, when set A has n elements
   b. The number of all subsets of A ∪ B when A ∩ B = ∅
   c. The number of all subsets of k elements with or without element ***A***
   d. The number of bit strings whose length is n + 1 and contain k + 1 ones.

Quiz 3B
Counting

Name_____

ID_____No._____

---

6. **(2 points)** Since CEDT students love croissants very much, TA Build thinks it is a great idea to open a croissant shop. His shop has 6 flavors of croissant: CHOCOLATE, STRAWBERRY, VANILLA, GREEN TEA, CHERRY and ALMOND.

   6.1. TA Khun wants to buy 10 croissants. How many different ways can he buy croissants?

   6.2. TA Fah wants to buy 10 croissants, but she doesn't like VANILLA, so she will buy at most 2 VANILLA croissants. How many different ways can she buy croissants?

   6.3. TA Jin does not want to buy much, so he decides to buy at most 12 croissants with at least 2 CHOCOLATE croissants. How many different ways can he buy croissants?

   6.4. TA Tar wants to buy 12 croissants, and he wants to buy at least 1 CHERRY and 1 GREEN TEA croissants.How many different ways can he buy croissants?

   6.5. The customer wants TA Build to make 4 random snack boxes labeled as B1, B2, B3 and B4, where each box can contain only 1 type of croissant. How many different ways can he make the snack boxes? (Like other random boxes it does not guarantee that we got all different croissants!)

7. Considering that the map in the real world is represented in xyz space, how many ways does CEDT students travel from their classroom (2, 1, 0) to croissant's shop (6, 3, 3) by taking steps one unit in the positive x, positive y or positive z direction?

8. Let
   A be a number of all different strings that can be made from the letters in "SALAD", using all the letters
   B be a number of all different strings that can be made from the letters in "CROISSANT", using all the letters,
   Find **B**/(54**A**) = ?

9. Given $A = (3x - y)^{45}$, answer the following question

   9.1. How many terms are there in the expansion of A after like terms are collected?

   9.2. Consider $a^{n-r}b^{r}C(n, r)$ is the coefficient of $x^{10}y^{35}$.
   Determine the value of |a|, |b|, n and r, when a, b, n, r are integer, $r \leq n - r$

   |a| = _____ |b| = _____ n = _____ r = _____

Quiz 3B
Counting

Name_____

ID_____No._____

10. How many ways is there when a fair coin is flipped seven times, the tails come up exactly five times, **or** the first and last flips come up tails, **or** the second and fourth flips come up heads.

11. Find the **square root** of the minimum number of students in a class which can ensure that three of them are born in the same month?

12. It's almost Christmas time!! (2 months is almost), and Santa Claus is preparing to deliver his gifts to the children! Let's help Santa figure out how many ways he can distribute six different gifts to three students, making sure each student gets at least one gift.

13. Let S = {1, 2, 3, 4}. Determine the total number of unordered pairs of disjoint subsets of S.
    [Definition: Two sets are disjoint if and only if they have no element in common]
    For instance, [{1, 2}, {3, 4}] is an example of unordered pairs of disjoint subsets of S.

14. How many solutions does the equation $x_1 + x_2 + x_3 = 12$ have where x_1, x_2 ,and x_3 are nonnegative integers less than 5?

15. Minji, Hanni, and Haerin are members of NewJeans. They are playing a number guessing game. In this game, Minji receives a random number **N**, and then sends a message as a bitstring to Hanni. However, in the process, Haerin knows that and wants to do a little tricky thing like swap the order of the bit. E.g., Minji sends “01101”, Haerin then swaps it into “11010”. (Notice that the number of “0” and “1” before swap is the same as the after one)

    Fortunately, Minji and Hanni are clever, so they decide to have their own communication rules. If they know that **N** is an integer and $1 \leq \mathbf{N} \leq 107$, what is the minimum length of the longest bitstring that could allow Minji to know the number Hanni sent even if the bitstring was swapped?

Name_____ID_____Number_____**Quiz3B**

COUNTING

Part A: Choose the correct answer and provide the **X** mark.

No.	Choice				No.	Choice				No.	Choice			
	a.	b.	c.	d.		a.	b.	c.	d.		a.	b.	c.	d.
1.					3.					5.				
2.					4.									

Part B: Provide your answer **IN THE INTEGER FORM** in the space provided.

6.1		6.2		6.3	
6.4		6.5			

7.		8.	

9.1	

9.2	|a|		|b|		n		r	

10.		11.	

12.		13.	

14.		15.	