Name: ____________________

(ID:54) 1. You have 5 colored beads to arrange into a necklace. How many unique necklaces can be made if rotations and flips are considered the same necklace?

(ID:64) 2. 8 children are to be seated around a circular playmat. How many different seating arrangements are possible?

(ID:53) 3. An ice cream parlor offers fourteen flavors. How many different combinations of four flavors can you choose if the order doesn't matter?

(ID:56) 4. You have a room with 8 light bulbs, each controlled by a separate switch. How many ways can you turn on 5 lights if the order in which you turn them on doesn't matter?

(ID:57) 5. If you have to do 6 out of 14 math problems for homework, how many different sets of 6 problems can you choose?

(ID:61) 6. How many ways can you choose 4 markers from a set of 9 different colored markers?

(ID:62) 7. A pizza place offers 5 toppings. How many different pizzas can be made if a pizza must have at least 4 and at most 5 toppings?

(ID:65) 8. From a deck of 81 cards, how many ways can you choose 2 cards, where the order of the cards doesn't matter?

(ID:67) 9. A club with fourteen members needs to form a committee of four. How many different committees can be formed?

(ID:68) 10. What is the total number of different committees that can be formed by selecting 3 or more persons from a group of 9 people?

Name: ______________________________

Answer Key

1. 4!/2
2. 5040
3. 1001
4. 56
5. 3003
6. 126
7. 6
8. 3240
9. 1001
10. 466

 Name: ____________________

Solution to Problem 1

To find how many unique necklaces can be made with 5 colored beads, where rotations and flips are considered the same:

Step 1: Calculate circular arrangements
For 5 distinct beads in a circle, rotations are equivalent, so we use: $(n-1)!$, where $n=5$.

Step 2: Account for reflections
Since flips are also equivalent, divide by 2:

$$\frac{(n-1)!}{2}$$

Step 3: Substitute values
For $n=5$, compute:

$$\frac{(5-1)!}{2} = \frac{4!}{2} = \frac{24}{2} = 12$$

Step 4: Final Answer

$\boxed{12}$ unique necklaces

 Name: ____________________

Solution to Problem 2

To find how many different seating arrangements are possible for 8 people at a round table:

Step 1: Understand circular arrangements
For 8 people in a circle, rotations are equivalent, so we use: $(n-1)!$.

Step 2: Substitute values
For $n = 8$, compute: $(8-1)! = 7!$.

Step 3: Final Answer
The number of arrangements is $(8-1)! = 7! = 5040$.

$$\boxed{5040}$$

Solution to Problem 3

To find how many different combinations of four flavors can be chosen from fourteen flavors, if order doesn't matter:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 14$ and $k = 4$, compute:

$$C(14,4) = \frac{14!}{4!(14-4)!} = \frac{14 \times 13 \times 12 \times 11}{4 \times 3 \times 2 \times 1} = \frac{24024}{24} = 1001$$

Step 3: Final Answer
The number of combinations is

$$\boxed{1001}$$

 Name: ______________________

Solution to Problem 4

To find how many ways to turn on 5 lights from 8 light bulbs, where order doesn't matter:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 8$ and $k = 5$, compute:

$$C(8,5) = \frac{8!}{5!(8-5)!} = \frac{8 \times 7 \times 6 \times 5 \times 4}{5 \times 4 \times 3 \times 2 \times 1} = \frac{6720}{120} = 56$$

Step 3: Final Answer
The number of ways is

$$\boxed{56}$$

 Name: ______________________

Solution to Problem 5

To find how many different sets of 6 problems can be chosen from 14 math problems:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 14$ and $k = 6$, compute:

$$C(14,6) = \frac{14!}{6!(14-6)!} = \frac{14 \times 13 \times 12 \times 11 \times 10 \times 9}{6 \times 5 \times 4 \times 3 \times 2 \times 1} = \frac{2162160}{720} = 3003$$

Step 3: Final Answer
The number of sets is

$$\boxed{3003}$$

Name: ______________________________

Solution to Problem 6

To find how many ways to choose 4 items from a set of 9 different colored items:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 9$ and $k = 4$, compute:

$$C(9,4) = \frac{9!}{4!(9-4)!} = \frac{9 \times 8 \times 7 \times 6}{4 \times 3 \times 2 \times 1} = \frac{3024}{24} = 126$$

Step 3: Final Answer
The number of ways is

$$\boxed{126}$$

Name: ________________________________

Solution to Problem 7

To find how many different pizzas can be made with 5 toppings, choosing at least 4 and at most 5 toppings:

Step 1: Understand the combination sum
For each k from 4 to 5, compute combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Sum the combinations
Sum: $\sum_{k=4}^{5} C(5,k)$.
Compute each term:

$$C(5,4) = 5, \quad C(5,5) = 1$$

Sum these values:

$$5 + 1 = 6$$

Step 3: Final Answer
The number of pizzas is

$$\boxed{6}$$

 Name: ____________________

Solution to Problem 8

To find how many ways to choose 2 cards from a deck of 81 cards, where order doesn't matter:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 81$ and $k = 2$, compute:

$$C(81,2) = \frac{81!}{2!(81-2)!} = \frac{81 \times 80}{2 \times 1} = \frac{6480}{2} = 3240$$

Step 3: Final Answer
The number of ways is

$$\boxed{3240}$$

Name: ______________________

Solution to Problem 9

To find how many different committees of four members can be formed from fourteen members:

Step 1: Understand the combination formula
Since order does not matter, we use combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Substitute values
For $n = 14$ and $k = 4$, compute:

$$C(14,4) = \frac{14!}{4!(14-4)!} = \frac{14 \times 13 \times 12 \times 11}{4 \times 3 \times 2 \times 1} = \frac{24024}{24} = 1001$$

Step 3: Final Answer
The number of committees is

$$\boxed{1001}$$

 Name: ______________________

Solution to Problem 10

To find the total number of different committees with 3 or more persons from 9 people:

Step 1: Understand the combination sum
For each k from 3 to 9, compute combinations:

$$C(n,k) = \frac{n!}{k!(n-k)!}$$

Step 2: Sum the combinations
Sum: $\sum_{k=3}^{9} C(9,k)$.
Compute each term:

$$C(9,3) = 84, \quad C(9,4) = 126, \quad C(9,5) = 126, \quad C(9,6) = 84, \quad C(9,7) = 36, \quad C(9,8) = 9, \quad C(9,9) = 1$$

Sum these values:

$$84 + 126 + 126 + 84 + 36 + 9 + 1 = 466$$

Step 3: Final Answer
The number of committees is

$$\boxed{466}$$