I verify on my honor that I have neither given nor received any help, or used any non-permitted resources, while completing this evaluation

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Quiz #3

1. The "nine different elements from X" represents the amount of pigeons (n) in this problem. The pigeonholes are represented by all the different ways to add two distinct elements and get 17. These pigeonholes (k) would be represented by {1, 16}, {2, 15}, {3, 14}, {4, 13}, {5, 12}, {6, 11} {7, 10}, {9, 8}

From this we see that:

pigeons(n) = 9

pigeonholes(k) = 8

Because nine different elements are chosen from X, it is inevitable that two numbers in the set of nine elements will add up to 17 because n<k, by the pigeonhole principle. For example:

1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3]17
4	4	4	4	4]17	14
5	5	5	5]17	13	15
6	6	6]17	12	14	16
7	7]	11	13	15	10
8]17	9 17	12	14	16	9
9	10]	13	15	10	8

These are a few examples of how a set with 9 elements would always have two elements that add up to 17. Basically, picking 9 elements guarantees you pick at least one element from all the pigeonholes, with the last element belonging to the same pigeonhole as another.

Diagram:

Too many pigeons to fit in 8 pigeonholes.

2. $\binom{5}{3} \cdot 3!$

60 strings