

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

- 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:

$$\text{pigeons}(n) = 9$$

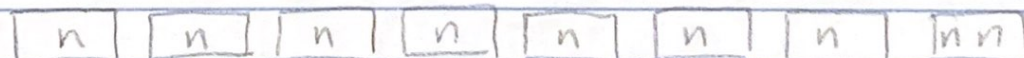
$$\text{pigeonholes}(k) = 8$$

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
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

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.  $\left(\frac{5}{3}\right) \cdot 3!$

60 strings