

Let $S = \{1, 2, 4, 8, 16, 32\}$.

Our main objective is to determine the total number of different sums that can be made with 3 distinct elements of S and to find the total number of these who are divisible by 4.

Consider the set $X = \{1, 2, 3, 4\}$ observe that $2 + 3 = 1 + 4$ so the the total number of different sums of X , is not simply $\binom{4}{2}$. So we must verify that indeed each of our sums are unique.

We note that S consists of powers of two and we know that every binary number represents a unique decimal number, so indeed each sum is unique and therefore there are $\binom{6}{3}$ of them.

We will now determine which sums are divisible by 4.