Subsets and binary strings

Theorem
A k-element set has 2^k subsets.

$\boxed{k=3}$	$\emptyset$	{A}	{B}	{C}	{A,B}	{A,C}	{B,C}	{A,B,C}

Proof
The subsets of a k-element set are encoded by binary strings of length k, i.e., by k-letter words in a 2-letter alphabet:

$\emptyset$	{A}	{B}	{C}	{A,B}	{A,C}	{B,C}	{A,B,C}
000	100	010	001	110	101	011	111

The number of such words is 2^k.