More Induction

Induction doesn’t only work for code!

Show that $\sum_{i=0}^{n} 2^i = 1 + 2 + 4 + \cdots + 2^n = 2^{n+1} - 1$.

Let $P(n) = \sum_{i=0}^{n} 2^i = 2^{n+1} - 1$.

We show $P(n)$ holds for all $n$ by induction on $n$.

Base Case ( )

Inductive Hypothesis:

Inductive Step:

$P(n)$ holds for all $n \geq 0$ by the principle of induction.

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Let’s Try Another! Stamp Collecting

I have 4 cent stamps and 5 cent stamps (as many as I want of each). Prove that I can make exactly $n$ cents worth of stamps for all $n \geq 12$.

Try for a few values.
Then think...how would the inductive step go?