Claim: If $a \mid b_1$, $a \mid b_2$, $\ldots$, $a \mid b_n$, then $a \mid \sum_{j=1}^{n} k_j b_j$ for any set of integers k_1, k_2, $\ldots$, k_n.
Justification:

1. Assume __________.
2. We proceed by induction.
3. For the inductive base, suppose __________.
   - 3a. By __________, $a \mid b_1$.
   - 3b. By __________, we can find $q_1 \in \mathbb{Z}$ such that $aq_1 = b_1$.
   - 3c. Let k_1 be any integer.
   - 3d. By __________, $k_1 b_1 = k_1 (aq_1) = a (k_1 q_1)$.
   - 3e. By closure of integer multiplication, __________.
   - 3f. By definition, then, $a_1 \mid k_1 b_1$.
4. For the inductive hypothesis, assume __________.
5. Now suppose that $a \mid b_1$, $\ldots$, $a \mid b_{n+1}$.
   - 5a. By the inductive hypothesis, __________.
   - 5b. We can rewrite $\sum_{j=1}^{n+1} k_j b_j$ as a sum of two sums, __________.
   - 5c. __________
   - 5d. By definition, then, $a_1 \mid \sum_{j=1}^{n+1} k_j b_j$.

This concludes the induction.