

$$= \prod_{\substack{n=1 \\ n \equiv 0 \pmod{4}}}^{\infty} (1 - q^n) \prod_{\substack{n=1 \\ n \equiv 0 \pmod{6}}}^{\infty} (1 - q^n)$$

$$\prod_{\substack{n=1 \\ n \equiv 0 \pmod{2}}}^{\infty} (1 - q^{2n}) \prod_{\substack{n=1 \\ n \equiv 0 \pmod{3}}}^{\infty} (1 - q^n)$$

$$= \prod_{\substack{n \geq 1 \\ n \equiv 0, 4, 8 \pmod{12}}} (1 - q^n) \prod_{\substack{n \geq 1 \\ n \equiv 2, 6, 10 \pmod{12}}} (1 - q^n)$$

$$\prod_{\substack{n \geq 1 \\ n \equiv 0, 2, 4, 6, 8, 10 \pmod{12}}} (1 - q^n) \prod_{\substack{n \geq 1 \\ n \equiv 3, 9 \pmod{12}}} (1 - q^n)$$

$$= \frac{1}{\prod_{\substack{n \geq 1 \\ n \equiv 2, 3, 6, 9 \pmod{12}}} (1 - q^n)}$$

$$= \sum_{n=0}^{\infty} b(n) q^n$$

Hence $a(n) = b(n)$ for $n \geq 0$.