The secret to using the sums table is to arrange the function being summed in the format $f(i) = b^{ai}\ i^d \log^e i$ and determine b^a, d, and e.

The following table outlines the few easy rules with which you will be able to compute $\Theta(\sum_{i=1}^{n} f(i))$ for functions with the basic form $f(n) = \Theta(b^{an} \cdot n^d \cdot \log^e n)$. (We consider more general functions at the end of this section.)

b^a	d	e	Type of Sum	$\sum_{i=1}^{n} f(i)$	Examples
> 1	Any	Any	**Geometric Increase (dominated by last term)**	$\Theta(f(n))$	$\sum_{i=0}^{n} 2^{2^i} \approx 1 \cdot 2^{2^n}$ $\sum_{i=0}^{n} b^i = \Theta(b^n)$ $\sum_{i=0}^{n} 2^i = \Theta(2^n)$
$= 1$	> -1	Any	**Arithmetic-like (half of terms approximately equal)**	$\Theta(n \cdot f(n))$	$\sum_{i=1}^{n} i^d = \Theta(n \cdot n^d) = \Theta(n^{d+1})$ $\sum_{i=1}^{n} i^2 = \Theta(n \cdot n^2) = \Theta(n^3)$ $\sum_{i=1}^{n} i = \Theta(n \cdot n) = \Theta(n^2)$ $\sum_{i=1}^{n} 1 = \Theta(n \cdot 1) = \Theta(n)$ $\sum_{i=1}^{n} \frac{1}{i^{0.99}} = \Theta(n \cdot \frac{1}{n^{0.99}}) = \Theta(n^{0.01})$
	$= -1$	$=0$	**Harmonic**	$\Theta(\ln n)$	$\sum_{i=1}^{n} \frac{1}{i} = \log_e(n) + \Theta(1)$
	< -1	Any	**Bounded tail (dominated by first term)**	$\Theta(1)$	$\sum_{i=1}^{n} \frac{1}{i^{1.001}} = \Theta(1)$ $\sum_{i=1}^{n} \frac{1}{i^2} = \Theta(1)$
< 1	Any	Any			$\sum_{i=1}^{n} (\frac{1}{2})^i = \Theta(1)$ $\sum_{i=0}^{n} b^{-i} = \Theta(1)$

(table from Jeff Edmonds, *How to Think About Algorithms*)

For example –

$\sum_{1}^{n} i = \sum_{1}^{n} 1 \cdot 1^i \cdot i^1 \cdot \log^0(i)$ thus $b^a = 1$, d = 1, e = 0

$\sum_{1}^{n} 4i^2 = \sum_{1}^{n} 4 \cdot 1^i \cdot i^2 \cdot \log^0(i)$ thus $b^a = 1$, d = 2, e = 0

$\sum_{1}^{n} 2^{3i} \log^2(i) = \sum_{1}^{n} 1 \cdot (2^3)^i \cdot i^0 \cdot \log^2(i)$ thus $b^a = 8$, d = 0, e = 2

Also keep in mind that when the 5th column in the table (showing the solution) references n, the "n" refers to the upper end of the sum – the column is showing the result for the sum from 1 to n. If you have a sum with a different upper range, it can be less confusing to first rewrite the pattern from the table with another symbol.

For example, $\sum_{1}^{n^2} i$ is of the $\Theta(n \cdot f(n))$ pattern, but the upper bound of the sum is n^2 rather than n. So, rewrite the table pattern with a new symbol (such as s): $\sum_{1}^{s} i = \Theta(s \cdot f(s))$. Then substitute n^2 for s to get the answer: $\sum_{1}^{n^2} i = \Theta(n^2 \cdot f(n^2)) = \Theta(n^3)$.