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$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

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$(k+1)^4 - k^4$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$
2^4

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$

$2^4 \quad - \quad 1^4$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$
$$2^4 \quad - \quad 1^4 \quad = 4 \times 1^3$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$2^4 \quad - \quad 1^4 \quad = 4 \times 1^3 \quad +6 \times 1^2$$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$2^4 \quad - \quad 1^4 \quad = 4 \times 1^3 \quad +6 \times 1^2 \quad + \quad 4 \times 1$$

$\sum_{k=1}^{n} k^3$

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$2^4 \quad - \quad 1^4 \quad = 4 \times 1^3 \quad +6 \times 1^2 \quad + \quad 4 \times 1 \quad + \quad 1$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$2^4 \quad - \quad 1^4 \quad = 4 \times 1^3 \quad +6 \times 1^2 \quad + \quad 4 \times 1 \quad + \quad 1$$

$$3^4$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$

$$\begin{array}{lllllll} 2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\ 3^4 & - & 2^4 & & & & \end{array}$$

$\sum_{k=1}^{n} k^3$

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$\sum_{k=1}^{n} k^3$

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$$\begin{array}{llllll} 2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\ 3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & & \end{array}$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$\begin{array}{llllll}
(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1 & & & & & \\
2^4 \quad - \quad 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 \quad - \quad 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$

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$\sum_{k=1}^{n} k^3$

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$$\begin{array}{cccccc} 2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\ 3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + \quad 4 \times 2 & + \quad 1 \\ & & \vdots & & & & \end{array}$$

$$\sum_{k=1}^{n} k^3$$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$\begin{array}{lllllll}
(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1 & & & & & & \\
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + \quad 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & \\
n^4 & - & & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{cccllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + \quad 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & \\
n^4 & - & (n-1)^4 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{llllllll}
(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1 & & & & & & & \\
2^4 & - & 1^4 & = 4 \times 1^3 & + 6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & + 6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$

$$\begin{array}{llllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{ccclclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + \quad 1
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & & & & & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & & & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{lcllcccc}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + \quad 4 \times 1 & + \quad 1 \\
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 & & \vdots & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + \quad 4 \times (n-1) & + \quad 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + \quad 4 \times n &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lclllclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1
\end{array}$$

$$(n+1)^4$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{lcclclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
 & & & & & & & & \\
(n+1)^4 & - & 1^4 & & & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

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2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \; 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \; 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + \; 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + \; 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{lccllclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{lclllllll}
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 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & & & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

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$$\begin{array}{llllllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lcclclcl}
2^4 & - & 1^4 & = 4\times 1^3 & +6\times 1^2 & + & 4\times 1 & + & 1 \\
3^4 & - & 2^4 & = 4\times 2^3 & +6\times 2^2 & + & 4\times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4\times (n-1)^3 & +6\times (n-1)^2 & + & 4\times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4\times n^3 & +6\times n^2 & + & 4\times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4\times \sum_{k=1}^{n} k^3 & +6\times \sum_{k=1}^{n} k^2 & + & 4\times \sum_{k=1}^{n} k & &
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$\begin{array}{lclllclcl}
2^4 & - & 1^4 & = 4\times 1^3 & +6\times 1^2 & + & 4\times 1 & + & 1 \\
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 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4\times (n-1)^3 & +6\times (n-1)^2 & + & 4\times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4\times n^3 & +6\times n^2 & + & 4\times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4\times \sum_{k=1}^{n} k^3 & +6\times \sum_{k=1}^{n} k^2 & + & 4\times \sum_{k=1}^{n} k & + & n
\end{array}$$

$\sum_{k=1}^{n} k^3$

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$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lclllclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4$$

$$\sum_{k=1}^{n} k^3$$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{llllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4 - 1^4$$

$$\sum_{k=1}^{n} k^3$$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lccllclcl}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4 - 1^4 = 4 \times \sum_{k=1}^{n} k^3$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lcllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + \quad 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + \quad 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + \quad n
\end{array}$$

$$(n+1)^4 - 1^4 = 4 \times \sum_{k=1}^{n} k^3 + 6$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{\frac{n(n+1)}{2}\right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{llllllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4 - 1^4 = 4 \times \sum_{k=1}^{n} k^3 + 6 \times \frac{n(n+1)(2n+1)}{6}$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{llllllllll}
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + & 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4 - 1^4 = 4 \times \sum_{k=1}^{n} k^3 + 6 \times \frac{n(n+1)(2n+1)}{6} + 4$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{ \frac{n(n+1)}{2} \right\}^2$$

$$\begin{array}{lcllllll}
(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1 & & & & & & & \\
2^4 & - & 1^4 & = 4 \times 1^3 & +6 \times 1^2 & + & 4 \times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4 \times 2^3 & +6 \times 2^2 & + & 4 \times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4 \times (n-1)^3 & +6 \times (n-1)^2 & + & 4 \times (n-1) & + \quad 1 \\
(n+1)^4 & - & n^4 & = 4 \times n^3 & +6 \times n^2 & + & 4 \times n & + \quad 1 \\
(n+1)^4 & - & 1^4 & = 4 \times \sum_{k=1}^{n} k^3 & +6 \times \sum_{k=1}^{n} k^2 & + & 4 \times \sum_{k=1}^{n} k & + \quad n
\end{array}$$

$$(n+1)^4 - 1^4 = 4 \times \sum_{k=1}^{n} k^3 + 6 \times \frac{n(n+1)(2n+1)}{6} + 4 \times \frac{n(n+1)}{2}$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{\frac{n(n+1)}{2}\right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{llllllll}
2^4 & - & 1^4 & = 4\times 1^3 & +6\times 1^2 & + & 4\times 1 & + \quad 1 \\
3^4 & - & 2^4 & = 4\times 2^3 & +6\times 2^2 & + & 4\times 2 & + \quad 1 \\
 & & \vdots & & & & & \\
n^4 & - & (n-1)^4 & = 4\times (n-1)^3 & +6\times (n-1)^2 & + & 4\times (n-1) & + \quad 1 \\
(n+1)^4 & - & n^4 & = 4\times n^3 & +6\times n^2 & + & 4\times n & + \quad 1 \\
(n+1)^4 & - & 1^4 & = 4\times \sum_{k=1}^{n} k^3 & +6\times \sum_{k=1}^{n} k^2 & + & 4\times \sum_{k=1}^{n} k & + \quad n
\end{array}$$

$$(n+1)^4 - 1^4 = 4\times \sum_{k=1}^{n} k^3 + 6\times \frac{n(n+1)(2n+1)}{6} + 4\times \frac{n(n+1)}{2} + n$$

$\sum_{k=1}^{n} k^3$

$$\sum_{k=1}^{n} k^3 = \left\{\frac{n(n+1)}{2}\right\}^2$$

$$(k+1)^4 - k^4 = 4k^3 + 6k^2 + 4k + 1$$

$$\begin{array}{lllllllll}
2^4 & - & 1^4 & = 4\times 1^3 & +6\times 1^2 & + & 4\times 1 & + & 1 \\
3^4 & - & 2^4 & = 4\times 2^3 & +6\times 2^2 & + & 4\times 2 & + & 1 \\
 & & \vdots & & & & & & \\
n^4 & - & (n-1)^4 & = 4\times (n-1)^3 & +6\times (n-1)^2 & + & 4\times (n-1) & + & 1 \\
(n+1)^4 & - & n^4 & = 4\times n^3 & +6\times n^2 & + & 4\times n & + & 1 \\
(n+1)^4 & - & 1^4 & = 4\times \sum_{k=1}^{n} k^3 & +6\times \sum_{k=1}^{n} k^2 & + & 4\times \sum_{k=1}^{n} k & + & n
\end{array}$$

$$(n+1)^4 - 1^4 = 4\times \sum_{k=1}^{n} k^3 + 6\times \frac{n(n+1)(2n+1)}{6} + 4\times \frac{n(n+1)}{2} + n$$

Github:
https://min7014.github.io/math20200720001.html

Click or paste URL into the URL search bar, and you can see a picture moving.