

$$1. \sum_{k=1}^4 \frac{1}{k} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4}$$

$$2. \sum_{k=1}^4 \frac{12}{k} = \frac{12}{1} + \frac{12}{2} + \frac{12}{3} + \frac{12}{4}$$

$$3. \sum_{i=1}^3 (i+2) = (1+2) + (2+2) + (3+2)$$

$$4. \sum_{i=1}^5 (2i+1) = [2(1)+1] + [2(2)+1] + [2(3)+1] + [2(4)+1] + [2(5)+1]$$

$$5. \sum_{i=0}^4 \frac{i}{4} = \frac{0}{4} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{4}{4}$$

$$6. \sum_{k=-2}^2 3k = 3(-2) + 3(-1) + 3(0) + 3(1) + 3(2)$$

$$7. \sum_{k=1}^4 \cos k\pi = \cos 1\pi + \cos 2\pi + \cos 3\pi + \cos 4\pi$$

$$8. \sum_{i=1}^4 (-1)^i = (-1)^1 + (-1)^2 + (-1)^3 + (-1)^4$$

$$9. \sum_{i=1}^4 (-1)^{i+1} = (-1)^{1+1} + (-1)^{2+1} + (-1)^{3+1} + (-1)^{4+1}$$

$$10. \sum_{i=1}^6 i$$

$$11. \sum_{i=1}^4 i^2$$

$$12. \sum_{i=1}^4 \frac{1}{2^i}$$

$$13. \sum_{i=1}^5 -(-1)^i \left(\frac{i}{5}\right)$$

$$14. \sum_{k=1}^{10} k = \frac{10(11)}{2}$$

$$15. \sum_{k=1}^7 2k = 2 \sum_{k=1}^7 k = 2 \frac{7(8)}{2} = 56$$

$$16. \sum_{i=1}^6 (i^2 + 5) = \sum_{i=1}^6 i^2 + \sum_{i=1}^6 5 = \frac{6(7)(13)}{6} + (6)(5) = 121$$

$$\begin{aligned}
17. \quad \sum_{i=1}^5 i(i-5) &= \sum_{i=1}^5 (i^2 - 5i) \\
&= \sum_{i=1}^5 i^2 - 5 \sum_{i=1}^5 i \\
&= \frac{5(6)(11)}{6} - 5 \frac{5(6)}{2} \\
&= -20
\end{aligned}$$

$$\begin{aligned}
18. \quad \sum_{i=1}^7 (2i-8) &= 2 \sum_{i=1}^7 i - \sum_{i=1}^7 8 \\
&= 2 \frac{7(8)}{2} - 8(7) \\
&= 0
\end{aligned}$$

$$\begin{aligned}
19. \quad \sum_{i=1}^{100} (2-5i) &= \sum_{i=1}^{100} 2 - 5 \sum_{i=1}^{100} i \\
&= 200 - 5 \frac{100(101)}{2} \\
&= -25050
\end{aligned}$$

$$\begin{aligned}
20. \quad \sum_{i=1}^n 2i &= 2 \sum_{i=1}^n i \\
&= 2 \frac{n(n+1)}{2} \\
&= n^2 + n
\end{aligned}$$

$$\begin{aligned}
21. \quad \sum_{i=1}^n (i^2 + 3i + 4) &= \sum_{i=1}^n i^2 + 3 \sum_{i=1}^n i + \sum_{i=1}^n 4 \\
&= \frac{n(n+1)(2n+1)}{6} + 3 \frac{n(n+1)}{2} + 4n \\
&= \frac{n^3 + 6n^2 + 17n}{3}
\end{aligned}$$

$$\begin{aligned}
22. \quad \sum_{i=1}^n (i+1)(i+2) &= \sum_{i=1}^n (i^2 + 3i + 2) \\
&= \sum_{i=1}^n i^2 + 3 \sum_{i=1}^n i + \sum_{i=1}^n 2 \\
&= \frac{n(n+1)(2n+1)}{6} + 3 \frac{n(n+1)}{2} + 2n \\
&= \frac{n^3 + 6n^2 + 11n}{3}
\end{aligned}$$

$$\begin{aligned}
23. \quad \sum_{i=1}^n (i^3 - i - 2) &= \sum_{i=1}^n i^3 - \sum_{i=1}^n i - \sum_{i=1}^n 2 \\
&= \frac{n^2(n+1)^2}{4} - \frac{n(n+1)}{2} - 2n \\
&= \frac{n^4 + 2n^3 - n^2 - 10n}{4}
\end{aligned}$$