

## Summation Notation (or Sigma Notation)

Evaluate each sum.

1.  $\sum_{i=1}^5 i$

7.  $\sum_{k=1}^4 \sin\left(\frac{k\pi}{4}\right)$

2.  $\sum_{j=1}^4 3j$

8.  $\sum_{r=4}^7 {}_{11}C_r$

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

9.  $\frac{1}{2} \sum_{n=0}^4 n!$

4.  $\sum_{i=0}^4 23i^2$

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

5.  $\sum_{n=2}^4 3^{n+1}$

11.  $\sum_{b=0}^3 (2-bi)$ , where  $i = \sqrt{-1}$

6.  $\sum_{k=1}^4 (-1)^k k^2$

12.  $\sum_{m=1}^3 (2m-1)^{m-1}$

13. A ball is dropped from a height of 8 feet and allowed to bounce. Each time the ball bounces, it bounces back to half of its previous height. The vertical distance the ball travels,  $d$ , is given by the formula  $d = 8 + 16 \sum_{k=1}^n \left(\frac{1}{2}\right)^k$ , where  $n$  is the number of bounces. Based on this formula, what is the total vertical distance that the ball has traveled after four bounces?