Worksheet

Sigma notation

Σ is a short way of writing 'sum'.

EXAMPLE

Given: $1^2 + 2^2 + 3^2 + \ldots = \sum n^2$

Sigma can be written as: $\sum_{1}^{6} n^2 = 1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2$.

The number below the sigma sign signifies the value to be substituted for n to get the first term and the number above the sigma sign signifies the value to substitute into the last term.

Exercise 6

1. Write the following series in sigma notation.

1.1 $2 + 7 + 12 + 17 + \ldots$

1.2 $5 + 8 + 11 + 14 + \ldots$

1.3 $6 + 3 + \frac{3}{2} + \frac{3}{4} + \ldots$

1.4 $5 + 15 + 45 + 135 + \ldots$

2. Calculate the value of a if $\sum_{k=1}^{4} (a.2^{k-1}) = 30$.

3. Given $\sum_{k=1}^{n} (3k + m) = \frac{3n^2 - n}{2}$, determine the value of m and hence calculate the 40th term of the sequence.

4. Determine the sum: $\sum_{k=1}^{20} [3 + 7(k - 1)]$.

5. Calculate the value: $\sum_{n=1}^{15} [2 + 3(n - 1)]$.

6. Solve for n: $\sum_{k=1}^{n} 8\left(\frac{1}{2}\right)^k = 7\frac{15}{16}$.

7. Calculate the value of n if $\sum_{k=1}^{n} (20 - 4k) = -20$

8. Determine $\sum_{k=3}^{\infty} 5.2^{-k+2}$.

9. Determine the value: $\sum_{k=1}^{\infty} 54\left(\frac{1}{3}\right)^{k-1}$.

10. Given that $\sum_{n=1}^{\infty} ar^{n-1} = 3$ where $-1 < r < 1$.

10.1 Write down an equation relating a, r and 3.

10.2 A second series is formed by squaring the terms of the series above. The sum to infinity of this series is also equal to 3. Determine the values of a and r.