3A Summations

$$\sum_{r=1}^{n} 1 = n$$

$$\sum_{r=1}^{n} r = \frac{1}{2}n(n+1)$$

1. Calculate the sum of the series indicated below:

a)

$$\sum_{r=1}^{50} r$$

b)

$$\sum_{r=21}^{60} r$$

Splitting up Series:

$$\sum_{r=1}^{n}(ar+b) = a\sum_{r=1}^{n} r + b\sum_{r=1}^{n} 1$$

2. Show that:

$$\sum_{r=1}^{n}(3r+2)$$

Can be written as:

$$3\sum_{r=1}^{n} r + 2\sum_{r=1}^{n} 1$$

3. Evaluate

$$\sum_{r=1}^{25}(3r+1)$$

4.

a) Show that

$$\sum_{r=1}^{n}(7r-4)=\frac{n}{2}(7n-1)$$

b) Hence, calculate the value of:

$$\sum_{r=20}^{50}(7r-4)$$

3B Quadratic & Cubic Series

$$\sum_{r=1}^{n} r^2 = \frac{n}{6}(n+1)(2n+1)$$

$$\sum_{r=1}^{n} r^3 = \frac{n^2}{4}(n+1)^2$$

1. Evaluate

a)

$$\sum_{r=1}^{30} r^2$$

b)

$$\sum_{r=20}^{40} r^3$$

2.

a) Find

$$\sum_{r=n+1}^{2n} r^2$$

b) Verify that the result is correct for n = 1, 2 and 3

3.

a) Show that:

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

b) Hence, calculate the sum of the series:
4 + 10 + 18 + 28 + 40 … … … + 418

4. Find a formula for the sum of the series:

$$\sum_{r=1}^{n} r(r+3)(2r-1)$$