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