**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:

$$\sum\_{r=1}^{50}r$$

$$\sum\_{r=21}^{60}r$$

Splitting up Series:

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

1. Show that:

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

Can be written as:

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

1. Evaluate

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

1. Show that

$$\sum\_{r=1}^{n}(7r-4)=\frac{n}{2}\left(7n-1\right)$$

1. Hence, calculate the value of:

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

**3B Quadratic & Cubic Series**

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

$$\sum\_{r=1}^{n}r^{3}= \frac{n^{2}}{4}\left(n+1\right)^{2}$$

1. Evaluate

$$\sum\_{r=1}^{30}r^{2}$$

$$\sum\_{r=20}^{40}r^{3}$$

1. Find

$$\sum\_{r=n+1}^{2n}r^{2}$$

1. Verify that the result is correct for n = 1, 2 and 3
2. Show that:

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

1. Hence, calculate the sum of the series:

4 + 10 + 18 + 28 + 40 … … … + 418

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

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