

### Arithmetic Sequence

Recursive formulation

$$a_1 = a, a_n = a_{n-1} + d$$

Start somewhere and add d

Formula for n<sup>th</sup> term

$$a_n = a + d(n-1)$$

d add n-1 times to a

Sum of series

$$S_n = \frac{n}{2}(a + a_n)$$

Based on Gauss's trick

### Geometric Sequence

$$a_1 = a, a_n = ra_{n-1}$$

Start somewhere and multiply by r

$$a_n = ar^{n-1}$$

a multiplied by r n-1 times

$$S_n = a \frac{1-r^n}{1-r} \quad \text{If } r \text{ doesn't equal } 0 \text{ or } 1$$

$$\sum_{k=1}^{\infty} ar^{k-1} = \frac{a}{1-r} \quad |r| < 1$$