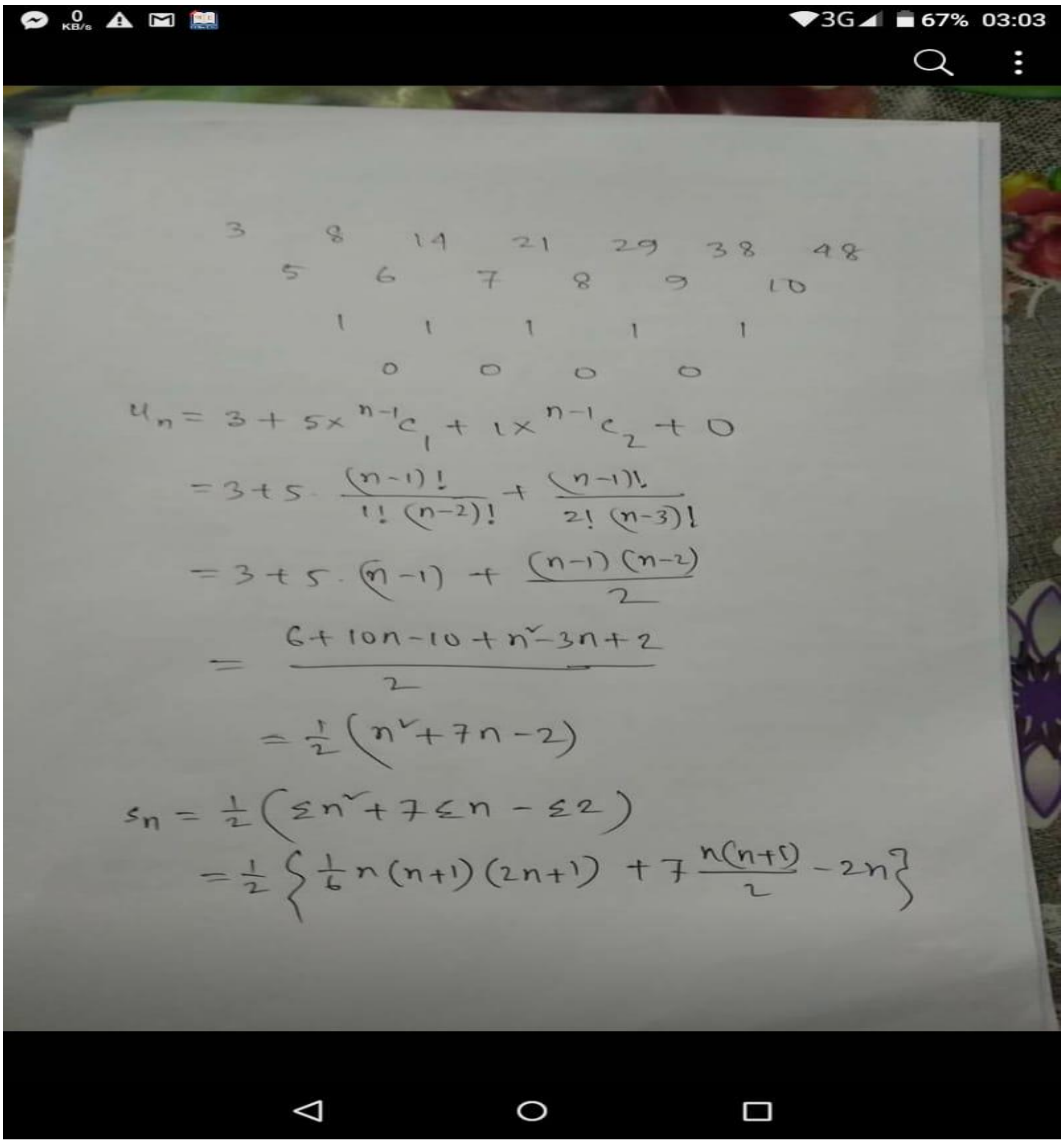
****************Series Summation Formulas******************

[resource: https://www.mathsisfun.com/algebra/sequences-sums-arithmetic.html]

1. **Arithmetic Progression:**
   i) **N^{th} term: $a_n = a+(n-1)d$**
   ii) **Summation: $S_n = (n/2)*(2a+(n-1)d)$**
2. **Geometric Progression:**
   i) **N^{th} term: $a_n = ar^{n-1}$**
   ii) **Summation: $S_n = a*((1-r^n)/(1-r))$ [for a finite series]**
   iii) **Summation to infinity: $S = a/(1-r)$ [where $-1 < r < 1$]**
3. **Multiple combination of Series:**



3 8 14 21 29 38 48

5 6 7 8 9 10

1 1 1 1 1

0 0 0 0

$$u_n = 3 + 5 \times {}^{n-1}C_1 + 1 \times {}^{n-1}C_2 + 0$$

$$= 3 + 5 \cdot \frac{(n-1)!}{1!\,(n-2)!} + \frac{(n-1)!}{2!\,(n-3)!}$$

$$= 3 + 5 \cdot (n-1) + \frac{(n-1)(n-2)}{2}$$

$$= \frac{6 + 10n - 10 + n^2 - 3n + 2}{2}$$

$$= \frac{1}{2}(n^2 + 7n - 2)$$

$$s_n = \frac{1}{2}\left(\Sigma n^2 + 7\Sigma n - \Sigma 2\right)$$

$$= \frac{1}{2}\left\{\frac{1}{6}n(n+1)(2n+1) + 7\frac{n(n+1)}{2} - 2n\right\}$$