15. The sequence a_1, a_2, a_3, ..., is defined by

$$a_1 = 16$$
$$a_{2n} = 2^n$$
$$a_{2n+1} = a_{2n-1} + 3$$

where $n \in \mathbb{N}$

(a) Deduce the value of k such that

$$a_k = a_1$$

(1)

(b) Evaluate

$$\sum_{r=1}^{20} a_r$$

(4)