Sigma Notation

In the Greek alphabet the letter Σ (sigma). we use sigma to represent the sum of a series

The upper limit of the summation
End the summation at term 8

Sigma stand s for "the sum of"

$$\sum_{k=1}^{8} 2^k$$

The general term of the sequence

The lower limit of the summation
Begin the summation at term 1

$2^1, 2^2, 2^3, \ldots\ldots 2^8$

Write the series represented by $\sum_{k=1}^{8} 2^k$ in expanded form and determine the sum.

$2^1, 2^2, 2^3, 2^4, 2^5, 2^6, 2^7, 2^8$

$2+4+8+16+32+64+128+256$

$$S_8 = \frac{2(2^8-1)}{2-1}$$

$$S_8 = 510$$

Write the series represented by $\boxed{\sum_{k=5}^{8} 5(2^{k+1})}$ in expanded form and determine the sum.

$5(2^{5+1}), 5(2^{6+1})$

$320, 640, 1280, 2560$

$S_4 = \frac{320(2^4-1)}{2-1} = 4800$

How many terms are in ther series??

Note: number of terms in a series = (upper limit - lower limit) + 1

Write the series $3+\frac{3}{2}+\frac{3}{4}+\frac{3}{8}+\frac{3}{16}+\frac{3}{32}$ in sigma notation

$$\sum_{n=1}^{6} \boxed{3\left(\frac{1}{2}\right)^{n-1}}$$

$$t_n = a(r)^{n-1}$$
$$= 3\left(\frac{1}{2}\right)^{n-1}$$

$$r = \frac{3}{2} \div \frac{3}{1}$$
$$r = \frac{3}{2} \times \frac{1}{3}$$
$$r = \frac{3}{6} = \frac{1}{2}$$

$$1 + 3 + 9 + 27 + 81$$

$$\sum_{n=1}^{5} 1(3)^{n-1}$$

A sequence is defined by the recursive formula $t_1 = 3$

$t_n = \cancel{5^{n-1}}\ 5 \cdot t_{n-1}$

a) List the first four terms in the sequence

$t_2 = 5 \cdot t_{2-1}$

$t_3 = 5 \cdot t_{3-1}$

3, 15, 75, 375

b) Find the sum of the first 12 terms in the series

$$S_{12} = \frac{3(5^{12}-1)}{5-1} = 183{,}105{,}468$$

c) Represent the series from part b using sigma notation.