Precalc 12.5

Use sigma notation

sigma Σ

$$\sum_{n=1}^{k} a_n$$

index of summation

typical element

factorial

Lesson 12-5 *(Pages 794–800)*

Write each expression in expanded form and then find the sum.

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

2. $\sum_{a=3}^{6} 4a$

3. $\sum_{k=3}^{7} (k^2 - 2)$

1	2	3	4	5	
$3 \cdot 1 - 1$	$3 \cdot 2 - 1$	$3 \cdot 3 - 1$	$3 \cdot 4 - 1$	$3 \cdot 5 - 1$	
2	5	8	11	14	$= 40$

4. $\sum_{j=4}^{8} \frac{j}{j+3}$

5. $\sum_{p=0}^{4} 3^p$

6. $\sum_{n=1}^{\infty} 2 \cdot \left(\frac{3}{4}\right)^n$

$n=1$	2	3	4
$2 \cdot \frac{3}{4}$	$2 \cdot \frac{9}{16}$	$2 \cdot \frac{27}{64}$	
$\frac{6}{4}$	$\frac{18}{16}$		
$\frac{3}{2}$	$\frac{9}{8}$		

$$\sum = \frac{a_1}{1-r}$$

$$= \frac{\frac{3}{2}}{1-\frac{3}{4}} = \frac{\frac{3}{2}}{\frac{1}{4}}$$

$$= \frac{3}{2} \cdot \frac{4}{1} = 6$$

Write each expression in expanded form and then find the sum.

4. $\sum_{n=1}^{6} (n-3)$ **5.** $\sum_{k=2}^{5} 4k$ **6.** $\sum_{a=0}^{4} \frac{1}{2^a}$ **7.** $\sum_{p=0}^{\infty} 5\left(\frac{3}{4}\right)^p$

$P=0$	1	2	3
$5 \cdot \frac{3}{4}^0$	$5 \cdot \frac{3}{4}$	$5 \cdot \frac{3}{4}^2$	...
5			

$$\frac{5}{1-\frac{3}{4}} = \frac{5}{\frac{1}{4}}$$

$$= 20$$

$3n$

Express each series using sigma notation.

7. $5 + 8 + 11 + 14$

8. $-8 - 12 - 16 - \cdots - 40$

$-4n$

$-40 = -4(n+1)$

1	2	3	4
$3 \cdot 1 + 2$	$3 \cdot 2 + 2$	$3 \cdot 3 + 2$	

1	2	3	4	$\cdots$ n
$-4 \cdot 2$	$-4 \cdot 3$	$-4 \cdot 4$		$-4(n+1)$
$-4(n+1)$				

$$\sum_{n=1}^{4} 3n+2$$

$$\sum_{n=1}^{9} -4(n+1)$$

$$-4n-4$$

typo...

9. $\frac{1}{4} + 1 + 4 + \cdots + 65{,}536$ $\sum_{n=1} 2^{2n}$

10. $1 + 2 + 6 + 24 + \cdots$

1	2	3 …	8
$\frac{1}{4}$	1	4	4 65,536
$\frac{1}{4} \cdot 4^{0}$	$\frac{1}{4} \cdot 4$	$\frac{1}{4} \cdot 4 \cdot 4$	

$\frac{1}{4} n \cdot 4^{n-1} = 65{,}536$

$$\sum_{n=1} \left(\frac{1}{4} \cdot 8\right) 4^{n-1}$$

TBU n

$$\begin{array}{ccccc} -1 & 0 & 1 & & \\ \hline \frac{1}{4} & 1 & 4 & \ldots & 65,536 \\ 2^{-2} & 2^0 & 2^2 & & 256^2 \\ & & & & 2^{16} \end{array}$$

$$2^{2n}$$

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

$$2^{16} = 2^{2n}$$

$$16 = 2n$$