Name:_____**Date:**_____

Add It Up!

Summation notation can be useful when working with sums of numbers, such as consecutive sums.

For instance, we can express the consecutive sum $3+4+5+6+7$ as

$$\sum_{r=3}^{7} r$$

This expression is read, "The summation, from *r* equals 3 to 7, of *r*." The symbol $\sum$ is an uppercase letter in the Greek alphabet, called *sigma*.

Similarly, the expression $\sum_{i=2}^{6} i$ means $2+3+4+5+6$. (This could also be written as $\sum_{n=2}^{6} n$ It doesn't matter what letter is used.)

This **sigma notation** can also be used for sums more complex than sums of consecutive numbers. For example,

$$\sum_{t=5}^{8} (4t^2+3)$$

represents the expression

$$(4\cdot 5^2+3)+(4\cdot 6^2+3)+(4\cdot 7^2+3)+(4\cdot 8^2+3)$$

In an expression such as

$$\sum_{t=5}^{8} (4t^2+3)$$

the number 5 is called the **lower limit**, the number 8 is called the **upper limit**, and the expression $4t^2+3$ is called the **summand**.

Name:_____ **Add It Up**

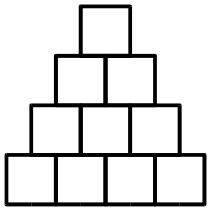
1. Write out each of these summation problems as a string of numbers added together.

a) $\sum_{z=3}^{8} z$

b) $\sum_{m=1}^{5} 2m$

c) $\sum_{c=2}^{9} (4c+7)$

2. Use summation notation to describe the number of squares in the picture.



3. Use summation notation to express each of these sums.

a) $10+11+12+13+14+15$

b) $3+6+9+12+15+18+21$

c) $8+11+14+17+20$

4. Use summation notation to describe the total number of small squares in the picture.