NAME:_____

1. Let $P(n)$ represent the statement:

   $12 + 16 + 20 + \cdots + (4n + 8) = 2n^2 + 10n$

   In the proof that $P(n)$ is true for all integers n, $n \geq 1$, what term must be added to both sides of $P(k)$ to show $P(k+1)$ follows from $P(k)$?

   [A] $4k + 12$ [B] $4k - 16$ [C] $4k + 8$ [D] $P(k+1)$

2. Let $P(n)$ represent the statement:

   $1 + 9 + 17 + \cdots + (8n - 7) = 4n^2 - 3n$

   In the proof that $P(n)$ is true for all integers n, $n \geq 1$, what term must be added to both sides of $P(k)$ to show $P(k+1)$ follows from $P(k)$?

   [A] $P(k+1)$ [B] $8k + 1$ [C] $8k - 7$ [D] $8k + 9$

3. Make a conjecture about the pattern of partial sums. (Hint: It will be of the form $S_n = an^2 + bn + c$.)
   Then prove your conjecture with mathematical induction.
   1
   $1 + 3 + 1$
   $1 + 3 + 5 + 3 + 1$
   $1 + 3 + \ldots + (2n - 3) + (2n - 1) + (2n - 3) + \ldots + 1$

4. Make a conjecture about the pattern of partial sums. (Hint: It will be of the form $S_n = an^2 + bn + c$.)
   Then prove your conjecture with mathematical induction.
   2
   $2 + 4 + 2$
   $2 + 4 + 6 + 4 + 2$
   $2 + 4 + \ldots + (2n - 2) + (2n) + (2n - 2) + \ldots + 2$

[1] A

[2] B

conjecture: $S_n = 2n^2 - 2n + 1$

[3] part of proof: Add $(2k - 1) + (2k + 1)$ to both sides of the S^k statement.

conjecture: $S_n = 2n^2$

[4] part of proof: Add $(2k) + (2k + 2)$ to both sides of the S^k statement.