

NAME: _____

1. 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.

$$\begin{aligned} &1 \\ &1 + 3 + 1 \\ &1 + 3 + 5 + 3 + 1 \\ &1 + 3 + \dots + (2n-3) + (2n-1) + (2n-3) + \\ &\dots + 1 \end{aligned}$$

2. 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.

$$\begin{aligned} &2 \\ &2 + 4 + 2 \\ &2 + 4 + 6 + 4 + 2 \\ &2 + 4 + \dots + (2n-2) + (2n) + (2n-2) + \dots + \\ &2 \end{aligned}$$

3. Let $P(n)$ represent the statement:
 $12 + 16 + 20 + \dots + (4n + 8) = 2n^2 + 10n$
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] $P(k+1)$

4. Let $P(n)$ represent the statement:
 $1 + 9 + 17 + \dots + (8n - 7) = 4n^2 - 3n$
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] $8k + 9$

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

part of proof: Add $(2k - 1) + (2k + 1)$ to

[1] both sides of the S^k statement. _____

conjecture: $S_n = 2n^2$

part of proof: Add $(2k) + (2k + 2)$ to both

[2] sides of the S^k statement. _____

[3] A _____

[4] B _____