Math 4 Honors Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 5-8: *Mathematical Induction* Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Learning Goal:**

* *I can use the principle of mathematical induction to verify sum formulas involving natural numbers.*

Consider the following pattern – the sum of the first *n* consecutive odd integers:

**.**

**.**

**.**



**Mathematical induction** is used for proving these patterns work for all values of *n.* It is a valid proof argument that is closely related to recursion.

 **Three-Step Process:**

1. Prove that *S*(1) is true. \*\*\*Let *n* = 1 on both sides.
2. Assume that *S*(*k)* is true for an arbitrary *k,* \*\*\*Let *n* = *k* on both sides.
3. Prove that *S*(*k +* 1) is true.
	1. \*\*\*Let *n* = (*k* + 1) on both sides. “Goal!”
	2. Write the recursive sentence.

* 1. Replace with expression from Step 2
	2. Match “Goal”: S(*k +* 1) from step 3.

 *How does this process work?*

Represent the final statement from above using summation notation. Then *prove* that the formula works for any value of *n.*

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**Example #1:**

Complete the following. Then represent the final statement using summation notation.



*S*(*n*) = =

 Prove *S*(*n*) :

**Example #2:**

Prove *S*(*n*) :

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*Show all work on another piece of paper.*

**Prove that each of the following is true.**

 In words, what statement is this proving?

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Homework:

Day 1: 1 – 4

Day 2: 5 – 8

Day 3: 9 & 10













