

**Section 9.4 Mathematical Induction**

**Objective:** In this lesson you learned how to use mathematical induction to prove a statement involving a positive integer  $n$ .

Course Number

Instructor

Date

**Important Vocabulary**

Define each term or concept.

**Mathematical induction****I. Introduction** (Pages 673–677)

To apply the Principle of Mathematical Induction, you need to be able to determine the statement \_\_\_\_\_ for a given statement  $P_k$ . To determine  $P_{k+1}$ , substitute the quantity  $k + 1$  for \_\_\_\_\_.

***What you should learn***

How to use mathematical induction to prove statements involving a positive integer  $n$

When using mathematical induction to prove a summation formula, it is helpful to think of  $S_{k+1}$  as . . .

Describe the process needed to prove a formula using mathematical induction.

The extended principle of mathematical induction is . . .

**II. Pattern Recognition** (Pages 677–678)

To find a formula for the  $n$ th term of a sequence, . . .

***What you should learn***  
How to recognize patterns and write the  $n$ th term of a sequence

**III. Sums of Powers of Integers** (Page 679)

List the formulas for the following sums of powers of integers.

1.  $1 + 2 + 3 + 4 + \cdots + n =$  \_\_\_\_\_

2.  $1^2 + 2^2 + 3^2 + 4^2 + \cdots + n^2 =$  \_\_\_\_\_

3.  $1^3 + 2^3 + 3^3 + 4^3 + \cdots + n^3 =$  \_\_\_\_\_

4.  $1^4 + 2^4 + 3^4 + 4^4 + \cdots + n^4 =$  \_\_\_\_\_

5.  $1^5 + 2^5 + 3^5 + 4^5 + \cdots + n^5 =$  \_\_\_\_\_

***What you should learn***  
How to find the sums of powers of integers

**IV. Finite Differences** (Page 680)

**First differences** of a sequence are found by . . .

***What you should learn***  
How to find finite differences of sequences

**Second differences** of a sequence are found by . . .

When the first differences of a sequence are all the same, the sequence has a \_\_\_\_\_ model.

When the second differences of a sequence are all the same, the sequence has a \_\_\_\_\_ model.

**Homework Assignment**

Page(s)

Exercises