Algebra 1

Chapter 1

Section 1.7 Algebraic patterns, an introduction

PROJECT MATHS Text & Tests 6

Example 1

Examine each of the following patterns of numbers and determine if there is a linear or quadratic relationship between the terms.

Write an algebraic expression for each set of numbers:

(a) $-2, 1, 4, 7, \ldots$ (b) $3, 5, 11, 21, \ldots$

Pattern: −2, 1, 4, 7
1st Difference: +3, +3, +3
2nd Difference: 0, 0

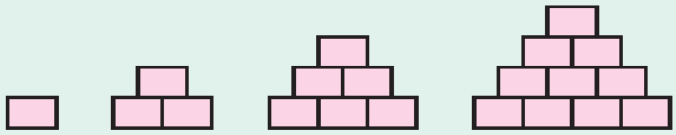
1st difference is constant ⇒ Linear

Pattern: 3, 5, 11, 21
1st Difference: +2, +6, +10
2nd Difference: +4, +4

2nd difference is constant ⇒ Quadratic

Example 2

Single matchsticks were used to form a sequence of patterns as shown. Find an algebraic quadratic expression for the number of matchsticks needed for each pattern. How many matchsticks are needed for the 10th pattern?



Pattern 4 10 18 28
1st Difference 6 8 10
2nd Difference 2 2

2nd difference is constant
so its a quadratic pattern.

Exercise 1.7

1. Examine each of the following patterns of numbers and determine if the pattern has a linear or quadratic relationship.

(a) 4, 7, 10, 13, 16, …

Pattern 4 7 10 13 16
1st Difference +3 3 3 3
2nd Difference 0 0 0

⇒ LINEAR

(b) −2, 2, 6, 10, 14, …

Pattern −2 2 6 10 14
1st Difference +4 4 4 4
2nd Difference 0 0 0

⇒ LINEAR