

Frogs, Fleas and Painted Cubes

Glossary

Constant Term – A number in an algebraic expression that is not multiplied by a variable

Expanded Form – the form of an expression composed of sums or differences of terms rather than products of factors

Function – the relationship between two variables in which the value of one variable depends on the value of the other variable.

Like Terms – Terms with the same variable raised to the same power.

Line of Symmetry – a line that divides a graph or drawing into two halves that are mirror images of each other

Linear Term – A part of an algebraic expression in which the variable is raised to the first power.

Parabola – the graph of a quadratic function.

Quadratic Term – A part of an algebraic expression in which the variable is raised to the second power.

Triangular Number – A quantity that can be arranged in a triangular pattern. The first four triangular numbers are 1, 3, 6, and 10.

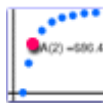
Web Resources

Algebra Tiles

<http://www.coe.tamu.edu/~strader/Mathematics/Algebra/AlgebraTiles/AlgebraTiles2.html>

Graphing the Situation

www.illustrations.nctm.org



Connected Mathematics Project

Everett Public Schools Mathematics Program

Frogs, Fleas, and Painted Cubes

Algebra Quadratic Relationships

Unit Goals:

- ♦ Analyzing quadratic relationships by examining tables, graphs, and equations
- ♦ Comparing characteristics of tables and graphs for quadratic relationships
- ♦ Understanding the significance of x- and y- intercepts
- ♦ Understanding the equivalence of two or more symbolic forms
- ♦ Attaching contextual meaning to equations

Proposed Time Frame:
Approximately 6 weeks

Mathematics in Investigations

Investigation 1: Introduction to Quadratic Relationships

- * Develop an awareness of quadratic functions and how to recognize them from patterns in tables and graphs
- * Describe patterns in tables of quadratic functions and predict subsequent entries
- * Recognize the characteristic shape of the graph of a quadratic function and observe such features as lines of symmetry, maximum points, and intercepts.
- * Use tables and graphs of quadratic relationships to answer questions about a situation
- * Represent some quadratic relationships with equations

Investigation 2: Quadratic Expressions

- * Develop an awareness of quadratic functions and how they can be recognized from patterns in tables, graphs and equations
- * Recognize a characteristic shape of the graph of a quadratic function and identify its line of symmetry, vertex, and intercepts
- * Develop an understanding of equivalent expressions, that is, of two expressions that model the same relationship
- * Recognize a quadratic function from an equation

Investigation 3: Quadratic Patterns of Change

- * Observe and describe patterns of regularity and change in data
- * Express data from a problem situation in tables, graphs, and equations
- * Make predictions based on data
- * Observe the pattern of change in a quadratic relationship
- * Understand that the same equation may model different situations

Investigation 4: What is a Quadratic Function:

- * Predict from tables, graphs, and equations whether quadratic functions have maximum or minimum values
- * Find and interpret maximum and minimum values from tables, graphs, and the factored form of equations
- * Describe patterns of change in tables and graphs of quadratic relationships
- * Make predictions based on data

Investigation 5: Painted Cubes

- * Observe patterns in tables of data
- * Express data from a problem situation in tables, graphs and equations
- * Make predictions based on data
- * Develop a deeper sense of the properties that characterize the quadratic relationships by comparing quadratic relationships to linear and cubic relationships



Tips for Helping at Home

Good questions and good listening will help children make sense of mathematics and build self-confidence. A good question opens up a problem and supports different ways of thinking about it. Here are some questions you might try, notice that none of them can be answered with a simple “yes” or “no”.

Getting Started

- * What do you need to find out?
- * What do you need to know?
- * What terms do you understand or not understand?

While Working

- * How can you organize the information?
- * Do you see any patterns or relationships that will help solve this?
- * What would happen if...?

Reflecting about the Solution

- * How do you know your answer is reasonable?
- * Has the question been answered?
- * Can you explain it another way?

At Home:

- 1 Talk with your child about what’s going on in mathematics class.
- 2 Look for ways to link mathematical learning to daily activities. Encourage your child to figure out the amounts for halving a recipe, estimating gas mileage, or figuring a restaurant tip.
- 3 Encourage your child to schedule a regular time for homework and provide a comfortable place for their study, free from distractions.
- 4 Monitor your child’s homework on a regular basis by looking at one problem or asking your child to briefly describe the focus of the homework. When your child asks for help, work with them instead of doing the problem for them.

At School

- 1 Attend Open House, Back to School Night, and after school events.
- 2 Join the parent-teacher organization

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