

## Growing, Growing, Growing Glossary

**Base** – The number that is raised to a power in an exponential expression.

**Compound Growth** – Another term for exponential growth, usually used when talking about the monetary value of an investment

**Decay Factor** – The constant factor that each value in an exponential decay pattern is multiplied by to get the next value.

**Exponent** – A number that indicates how many times another number (the base) is to be used as a factor. Exponents are written as raised numbers to the right of the base. In the expression  $3^5$ , read “3 to the fifth power,” 5 is the exponent.

**Exponential Decay** – a pattern of decrease in which each value is found by multiplying the previous value by a constant factor greater than 0 and less than 1.

**Exponential Growth** – A pattern of increase in which each value is found by multiplying the previous value by a constant factor greater than 1. For example, the pattern 1, 2, 4, 8, 16, 32 ... shows exponential growth.

**Standard Form** – The most common way to express a quantity. For example, 27 is the standard form of  $3^3$ .

## Web Resources

[WWW.illuminations.nctm.org](http://WWW.illuminations.nctm.org)

Shedding Light on the Subject: Function Models of Light Decay



## Connected Mathematics Project

### Everett Public Schools Mathematics Program

## Growing, Growing, Growing

### *Algebra*

#### Unit Goals:

- ♦ Building and analyzing exponential models
- ♦ Reasoning with and about exponential relationships
- ♦ Exploring the significance of shapes of graphs and patterns in tables
- ♦ Making sense of the symbols in the express  $y = a(b^x)$
- ♦ Exploring rates of growth
- ♦ Recognizing and describing situations that can be modeled with exponential functions
- ♦ Using exponents

Proposed Time Frame:  
Approximately 6 weeks

## Mathematics in Investigations



### Investigation 1: Exponential Growth

- \* Gain an intuitive understanding of basic experimental growth patterns
- \* Begin to recognize exponential patterns in tables, graphs, and equations
- \* Solve problems involving exponential growth
- \* Express a number that is the product of identical factors in exponential form and standard form

### Investigation 2: Growth Patterns

- \* Recognize patterns of exponential growth in tables and equations
- \* Compare and contrast exponential growth to linear growth
- \* Reason with and solve problems involving exponents and exponential growth
- \* Determine the growth factor in a given exponential model

### Investigation 3: Growth Factors

- \* Determine growth factors and create representations of an exponential population model given sample population data
- \* Investigate increases in the value of an asset due to compound growth
- \* Review and extend understanding of percent

### Investigation 4: Exponential Decay

- \* Recognize patterns of exponential decay in tables, graphs, and equations
- \* Use knowledge of exponents to write equations for models of exponential decay
- \* Reason about problems involving exponents and exponential decay.
- \* Describe the effects of varying the values of  $a$  and  $b$  in the equation  $y = a(b^x)$ . On the graph of that equation.

### 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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